THE IRON AGE

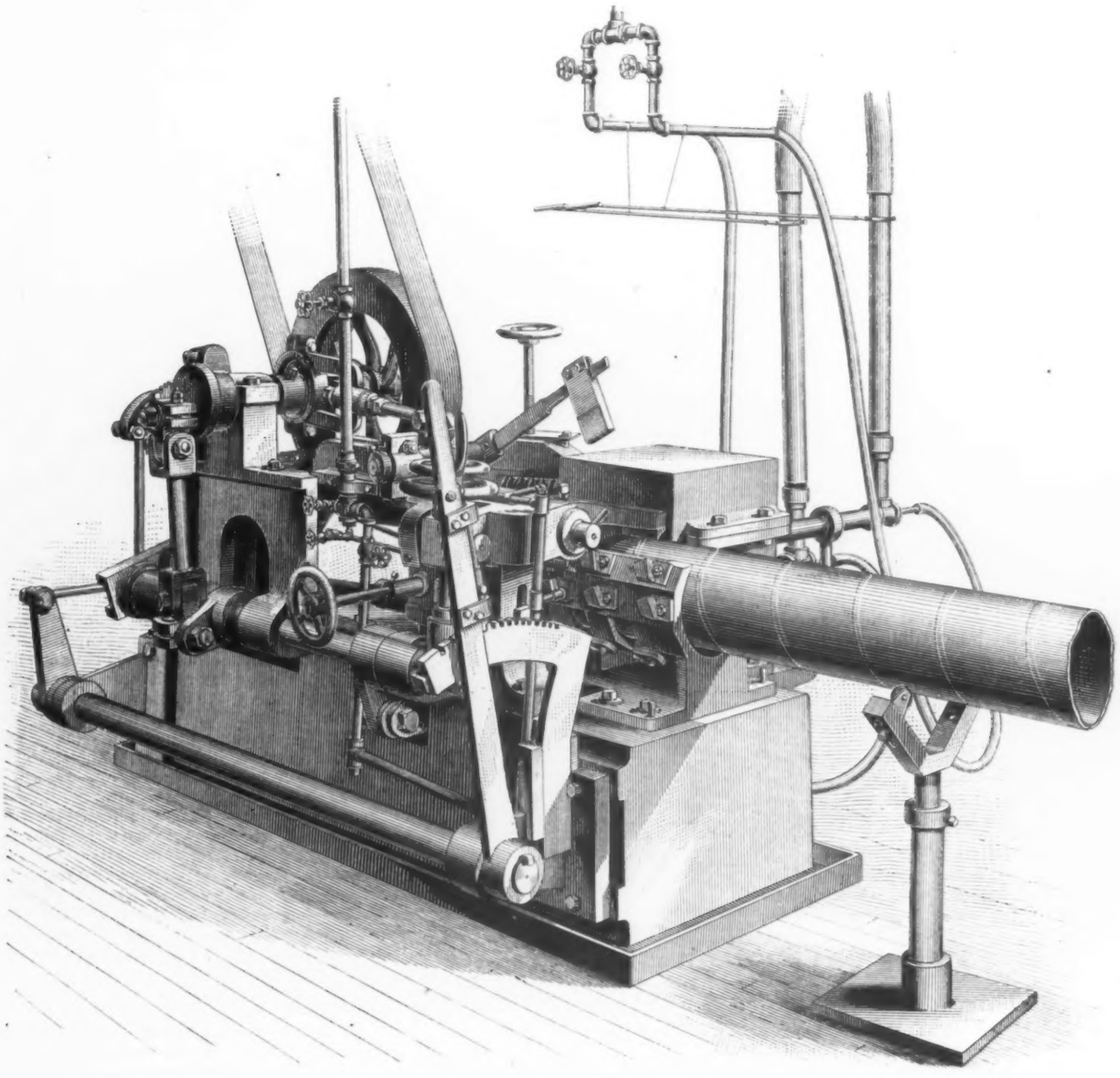
THURSDAY, MARCH 1, 1888.

Spiral Weld Tube Machine.

We were afforded an opportunity a short time ago to witness the manufacture of what is known as spirally welded tubing at the works of the Spiral Weld Tube Company, at East Orange, N. J. Of one of the machines used in the operation we take pleasure in presenting an engraving, made from a photograph, and which, while in certain respects unsatisfactory, will convey some idea of the appearance of the apparatus and the design adopted.

Before proceeding with the description of the machine, we will explain that the tubing is made from strips of steel or iron skelp wound spirally, heated along the overlapping edges and welded by hammering, the product being of uniform diameter and of any desired length, depending upon the requirements of convenient handling and transportation. The pipes are manufactured in a range of sizes which will soon include everything between 4-inch and 30-inch and as much larger as may be needed. The lightest metal thus far successfully made into pipe is No. 29 iron, and the heaviest, No. 14 steel. Heavier machines, however, are now building, by means of which it will be possible to handle heavier stock.

The first step in the process of manufacture is to slit the metal sheets into bands of the width most convenient for the production of the desired diameter of pipe. This is done with an ordinary rotary shear. The relation of width of skelp to diameter of pipe is not arbitrary. In 6-inch pipe, for example, 6, 8, 10 or 12 inch skelp may be used. The wider the skelp the faster the pipe is made. With 8-inch skelp 8.175 inches is added to the length of the pipe of 6 inches diameter at each revolution; with 12-inch skelp it gains 14.59 inches with each revolution. For convenience, four widths of skelp are used, 6, 12, 18 and 24 inch. As it is difficult to obtain sheets longer than 12 feet, it is necessary to unite the ends by lap welding, if long pipes are desired. To make a 6-inch pipe 30 feet long, from 12-inch skelp, it is necessary to have a ribbon of metal about 49 feet long. The ends of the strips of skelp are united by a machine known as a cross-welder. The sheets are so placed as to give about ½-inch lap, and in this position they are firmly clamped. Heat is then applied by furnaces above and below, which move along the seam. As they recede, the hot edges are welded between a hammer moving vertically and an anvil having reciprocal motion. To place and clamp the skelp, heat the overlapping ends and weld them, consumes about one minute to each cross seam. Before being fed into the pipe



MACHINE FOR THE MANUFACTURE OF SPIRALLY WELDED TUBING, AT THE WORKS OF THE SPIRAL WELD TUBE COMPANY, EAST ORANGE, N. J.

machines the skelp passes between pressure rolls which smooth out any inequality in the still hot metal, and rotary shears trim off the burr at the ends of the welded seam. In case the weld is defective or the sheets have not been clamped in line, the weld is cut by a shear held suspended by a counterbalance when not in use, and the ends are welded again. As the rule, the welding is smooth and perfect, and the extra thickness of metal at the weld occasions no inconvenience in forming the pipe.

The pipe machine proper occupies about 3 x 6 feet of floor space. One end of the ribbon of skelp is placed upon a guide-table, which is set at the angle due to the width of the skelp and the diameter of pipe into which it is to be made. The metal is carried into the machine between feed-rolls geared together and actuated by a ratchet, giving them an intermittent rotation and a rate of feed variable between $\frac{1}{8}$ and $\frac{5}{8}$ inch at each impulse at the pleasure of the operator. This carries it into the forming jaws which bend it to the desired curvature, the forming process being somewhat like that followed in rolling a cigar lighter from a strip of paper. The essential features of the machine are the guide-table for the skelp adjustable to the desired angle; the feed-rolls to pass it forward with an intermittent progress, so that it shall advance when the hammer is raised and be at rest when the hammer falls; a former to coerce the metal to the desired radius, also adjustable; a furnace to heat the metal, a hammer to weld it and an anvil to support the pipe and receive the shock of the hammer blows. No mandrel is used. The pipe in the forming process is held in place by a pipe mold, which is a cylindrical shell within which the pipe rotates as the stock is fed in. The anvil is of considerable mass, steel-faced, and extends the entire width of the skelp. The hammer is light and at normal speed strikes 160 blows per minute. The amount of feed is regulated by the lever and notched sector, shown at the side of the machine. The heating is effected in a furnace so constructed as to heat both the edges to be united for a space of several inches ahead of the point at which the welding is effected—the upper skelp as it enters flat and the lower skelp as curved in the preceding revolution. One or two blow pipes of water, gas and air are used, impinging upon the metal through passages of suitable form in the refractory lining of the furnace. One gas flame has been found sufficient, but two work better, and, besides being more convenient to control, they heat the metal more rapidly and admit of a more rapid feed. Very little gas, it is claimed, is wasted. the speed of production depends upon thickness of stock to be heated and the relation of width of skelp to diameter. It averages a foot per minute to each machine, and it is thought that this average can be raised considerably. The machines are so nearly automatic in operation that very little skilled labor is needed in running the plant. The operator has his gas, air and feed under control by convenient means, and varies these relations until he has them just as he wants them. He can see the edges as they emerge from the furnace, and about all the skill he needs is that which will enable him to judge by its color whether it is above, below or at the welding heat. Unskilled labor prepares the stock and removes the finished product. The ends of the pipe are cut square by suitable machinery. It is finished by treatment with asphalt, tested, and is ready for use. The pipe emerges from the machine as shown in our engraving. Six machines have already been built, with a range in diameter of from 4 inches to 16 inches, and others are in progress which will extend the range to 30 inches.

The uses to which spirally welded pipe can be put are of great variety. They include all the operations of hydraulic mining, mine draining and ventilation, the conveyance and distribution of water, natural gas, illuminating gas, steam, compressed air and petroleum. Perhaps the most interesting fact in connection with its manufacture is the number of new and unsuspected uses opening for it in lengths of from 12 inches to 4 feet. These seem great enough in the aggregate to absorb the production of more machines than one mill of convenient proportions would hold; and they have a special interest for the manufacturers, in that they seem to obviate all danger of waste from accidents, resulting in defects disclosed in the testing of long tubes.

The Italian Armor Clad Italia.

In a recent issue of *Engineering* are published two finely executed engravings, with description, of the celebrated Italian armor clad Italia—a vessel which has aroused more interest in naval circles than any other war ship since the French La Gloire was the means of introducing armor plating as a method of defense for ocean-going war vessels. The Italia and her sister ship the Lepanto were commenced about 10 years ago. In design they were an immense step on anything that had preceded them. Whether the step was in the right direction or not is a very much disputed point, on which many of the highest authorities in the science of naval construction all over the world hold diametrically opposite opinions. But one cannot help admiring the courage of the Italian naval authorities in laying down these two vast and costly ships, comprising so much in their design that was open to criticism, and necessarily involving features of doubtful advantage. The Italia was built at Castellamare, on the Bay of Naples, and the Lepanto at Leghorn. In them external armor is placed on a citadel 107 feet in length and descending for about 6 feet below the water-line. This central distance of 107 feet is the only part of the ship's side which is protected by vertical exterior armor.

The following are some of the particulars of design of the Italia and Lepanto:

	Ft.	in.
Length between perpendiculars	4 0	6
Breadth of beam at water-line	73	9
Breadth of beam at upper deck	65	6
Mean draft of water	28	0
Displacement at load draft ....13,480 tons.		
Extension of ram beyond forward perpendicular	6	4
Distance of point of ram below water-line.	8	6

Machinery.

	Sets.		
Number of engines	4	..	..
Number of cylinders	12	..	..
Number of propellers	2	..	..
Diameter of propellers	..	19	6
Number of boilers	26	..	.
Total grate area.....1521 square feet.			
Length of ship fore and aft occupied by engines, coal and boilers		250	0

The estimated weight of the armor is about 2898 tons, and of the machinery 2200 tons. The armament consists of four 110-ton guns supplied by Armstrongs. There are eight 6-inch Armstrong breech-loaders. Six of these are carried on the upper deck, two being respectively bow and stern chasers. There are six smaller quick-firing guns of 57 mm. caliber. There are machine guns comprising 22 Hotchkiss and quick-firing guns for the boats and landing parties. There will also be a number of Maxim guns. There are four torpedo ports arranged on the broadside, two ahead and two astern. The two sets of engines for driving each of the Italia's twin screws have each three cylinders of equal size arranged in line on the shafting. At full speed they all take steam direct from the boiler, but in ordinary working the foremost cylinder of each set alone takes steam from the boiler and exhausts into the other two cylinders. There are thus six cylinders to each propeller. The engines are placed amidships, the boilers being placed 14 before and 12 abaft them. The shafting runs under the after boilers. It is this unusual arrangement of the boilers which gives the vessel the somewhat peculiar appearance due to the position of the six chimneys, which are placed in two groups of three each before and abaft the barbettes. The latter are placed *en échelon*, and each one carries two of the monster 100-ton guns. The barbettes are contained in an armored casemate, which is supported by the unarmored structure of the ship. The space thus inclosed is entered from below through an armored shaft which leads below water to the space between the forward and after sets of engines. This armored tube serves as an ammunition shaft. The bases of the chimneys in each group are also protected by armored belts. The plated deck completes the armored protection of the ship. This deck extends from stem to stern, the armor being of steel and 3 inches thick.

Steel is largely used in the construction of the vessel. The bottom is sheathed with wood. The double bottom has 3 feet 3 inches between the two skins in the midship part. There are two longitudinal water-tight bulkheads, extending fore and att 254 feet. Altogether the hull is divided into 53 vertical divisions, these being split up again horizontally by the four decks. Cork stuffing is extensively used in the side compartments. Six feet above the water line is a deck of ordinary plating covered with wood; and above this is the battery deck, having a hight of 14 feet above the water-line. Again, 7 feet 9 inches above this is the upper deck, which supports the casemate containing the big guns mounted *en barbette*. The great hight at which the Italia carries her guns is a very strong point in favor of her design, such an element being to a warship of the present day, when armored decks form so important an element of defence, very much what length of reach is to a boxer. High speed is another and perhaps the most important advantage that was aimed at as a counterbalancing advantage in dispensing with side armor. It was hoped that the Italia would steam 18 knots, and this was all but got on her trial, the speed we believe that was registered being, as stated, 17.8 knots. The power developed by the engines was considerably short of the contract. It was expected to get 18,000 indicated horse-power, but there was a very large falling-off from this. There was, it is said, a difficulty in getting air down to the furnaces, and the necessary amount of coal could not be burnt. Alterations and improvements are now in course of consideration, and no doubt will lead to an increase in the power developed.

The Lepanto has made a satisfactory preliminary trial, and has also made a successful run at sea. The full-power trial of this ship has not yet taken place.

The London *Mining Journal* prints the following concerning the copper syndicate: It appears that the Société des Métaux has now definitely closed with the Spanish companies. Those best informed maintain that the arrangement has for basis the prices of £60 for Chili Bars, £64 for tough and £65 to £67 for B.'s; but each company has made the best terms it could for itself. The Société guarantees these prices as minimum, and share with the producers from one-half to one-third of the profits realized over and above the minimum. Each producer retains the sale in his own hands as hitherto; but if made to realize at anything over the minimum guaranteed, the Société undertakes to take over whatever part of the production remains unsold. The companies undertake not to produce more than the average of the last

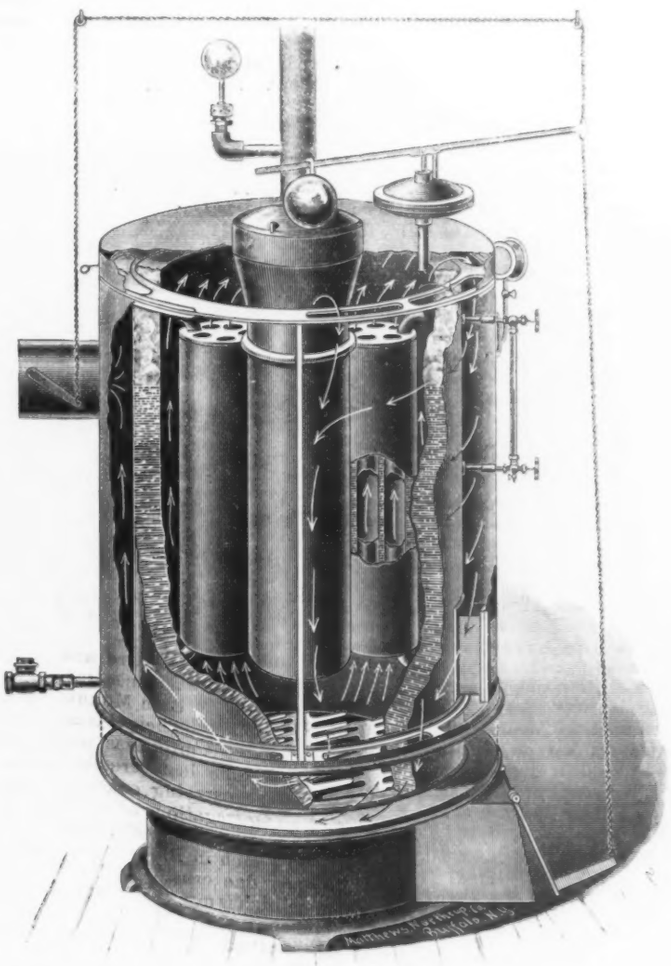
three years, and a clause provides for the reduction of output by 10 per cent. should the Société think fit to call upon them to take this step. A further clause provides for the prolongation, at the option of the Société, of the agreements for a further period of three years. Those said—either officially or on good authority—to have joined are the following, and we annex their approximate out-turns in tons: Cape Copper Company, 5300; Namaqua, 1500; Betts Cove, 1200; Vigsnaes, 2000; Rio Tinto, 25,000; Tharsis, 11,000; Mason and Barry, 7000; Calumet and Hecla (taking full capacity), 25,000; Boston and Montana (estimated), 10,000; Anaconda, 26,000; Tamarack, 3500; Quebrada, 4000; Arizona, 3000; Panulcillo, 3000; or, say, about 127,500 tons in all. There may be other Chilian and American producers which have not been specifically named, and perhaps some Australian producers. In any case, the prime movers flatter themselves that they will be able to control the production of about 150,000 tons out of a otal of about 220,000 tons. It will be readily seen that the Société has a very strong interest to keep prices up. At present, there is still great reluctance on the part of the ultimate consumption to follow or assist the advance, and there is a plethora of old metals everywhere. These two points, with the expected increase of production—partly from existing mines which are not included in the combination, but chiefly from new mines—are the chief factors which militate against copper.

The cable system for street railways has just been introduced at Birmingham, England.

The Silsby Heating Boiler.

We show on this page a sectional perspective of a compact and efficient form of heating boiler built by the Silsby Mfg. Company, of Seneca Falls, N. Y. It is the invention of Mr. Edwin Medden, for the past 17 years superintendent of the steam fire-engine department of the company, and was designed to meet the demand for a boiler for house-warming purposes.

The engraving clearly explains the design, and requires but little description. Lightness, strength, power and compactness are claimed for the boiler in an eminent degree. Though intended only for heating, it is capable of carrying a high pressure. Being light, it is readily transported and easily set up. By "power" is meant its ability to generate steam quickly and maintain it easily, which, it is claimed, is accomplished with great economy in the consumption of fuel. With regard to compactness, an enormous area of effective heating surface is inclosed in a small compass. The entire heating surface is so distributed as to best utilize all the products of combustion. The circulation of water through the water wall and tubes is rapid and perfect, the economy of which in any steam generator is of no little importance.



HEATING BOILER, BUILT BY THE SILSBY MFG. CO., SENECA FALLS, N. Y.

The boiler is constructed throughout of the best materials. The shell and fire-box are homogeneous steel boiler-plate, securely riveted, and the tubes are of lap-welded wrought iron. The draft is both direct and indirect. No brickwork is required, the outer jacket of galvanized iron lined with asbestos, guarding against radiation of heat and avoiding warmth in the cellar. There is an anti-clinker rocking grate operated on the outside by means of a lever. The heater is entirely automatic, requiring attention only once or twice in 24 hours, and then only to shake the grate and supply the magazine with coal. A woman or child, it is claimed, can care for and run it without difficulty. The heating surfaces are practically all vertical, and while not liable to an accumulation of soot and ashes, they are easily and quickly cleaned by removing the top plate. The heater is furnished complete with steam gauge, water glass, safety-valve, &c., and each one is thoroughly tested before leaving the factory. It is made in three sizes, ranging from 54 to 60 inches in hight, and from 24 to 30 inches in diameter.

The Explosive Nature of Chloride of Nitrogen.

A striking new experiment, exhibiting the terribly explosive nature of chloride of nitrogen, is, according to *Nature*, described by Prof. Victor Meyer in a recent number of a German magazine. A few drops of the yellow chloride were prepared in the usual manner by inverting an exceptionally thin flask filled with chlorine gas in a leaden dish containing a solution of ammonium chloride. Instead, however, of gently agitating the apparatus so as to cause the drops to fall into a smaller leaden capsule placed beneath the mouth of the flask, they were allowed to float freely upon the surface. The whole apparatus was then inclosed in a cover-box fitted with stout plate-glass sides, through the top of which was passed a bent pipette, turning up below just under the mouth of the flask and connected outside with a dropping funnel containing chloride of ammonium solution and a few drops of turpentine. When sufficient chloride of nitrogen had collected the tap of the funnel was carefully turned so as to allow a little turpentine to slowly rise in the flask. After a moment or two it reached the surface and mingled with the chloride of nitrogen, causing a brilliant flash of light and a loud explosion, which Professor Meyer likens to a thunder-clap, so much more powerful is the detonation in a confined space. The flask, of course, was shattered, not into powder, but into tolerably large fragments; the plate-glass box, however, even after many repetitions of the experiment, remained intact, a small door on the side away from the observers having been left ajar so as to prevent any notable increase of pressure. Curiously, the chloride of nitrogen never entirely exploded; a part remained in the distorted leaden dish and maintained an incessant fusillade for more than a minute.

It is of interest to add here also that at a recent meeting of the Göttingen (Germany) Chemical Society, Dr. Gattermann read a preliminary note upon his recent researches as to the nature of chloride of nitrogen. From his analyses it appears pretty clear that the yellow liquid is a mixture of at least two distinct chlorides, which he has hopes of being able to separate. During the course of the experiments the reason of its capricious behavior, the cause of so many painful accidents in the past, was happily discovered. It is decomposed by the actinic rays of light, being rapidly acted upon by sunlight with periodic spontaneous explosion, and is at once fired by exposure to the rays of burning magnesium. Hence further light upon this difficult and dangerous subject can only emanate from the dark room, a paradox the truth of which Dr. Gattermann is endeavoring to demonstrate.

Mr. G. W. Goetz, of Cleveland, has gone abroad to study recent progress there in the basic steel process.

On the Dressing of Non-Bessemer Ores.*

BY G. W. MAYNARD AND W. B. KUNHARDT.

The scarcity of Bessemer ore deposits in the Atlantic seaboard has led to continual large importations of foreign ore, and recently to heavy purchases of Lake Superior ore for Eastern steel works. But the growing demand for Bessemer ore has also directed attention to raising the purity and richness of eastern ores to the Bessemer standard by dressing. Where shorter or cheaper haulage to centers of consumption compensates for such treatment the dressed ore can compete with rich native or foreign ores to the extent to which fine material can in present practice be introduced into the blast-furnace burden. Mr. E. S. Moffat, general manager of the Lackawanna Iron and Coal Company, states in a communication to the writers:

"For nearly three months we ran one of our Scranton furnaces on Chateaugay 'separated' ore [none of which is coarser than quarter-inch size] to the extent of 25 per cent. of the ore mixture in addition to the usual quantity of fines in the other ores. Subsequently we ran another furnace on 50 per cent. 'separated Chateaugay' for several weeks. In both cases this ore worked well and we had no trouble in using it. When working 25 per cent. of separated ore we had the furnace on four-fifths anthracite and one-fifth coke; when working 50 per cent. separated ore we used two-thirds anthracite and one-third coke. Chateaugay is the only separated ore we have used. I am not prepared to say how much dressed ore we could use with coke alone; I only know that we have worked 50 per cent. of dressed ore with one-third coke with good results, and are quite confident of being able to run continuously on that proportion."

Through Prof. William B. Potter, of Washington University, it is learned that the Bessemer furnaces of the South St. Louis Iron Company have at times run altogether on Iron Mountain dressed ore; some of this, however, is of coarse egg size, while the average might be called half-inch stuff. This practice was always satisfactory; the high blast pressure which was necessary promoted a large output.

As the highest admissible phosphorus limit in pig iron destined for the acid Bessemer process is, generally speaking, 0.10 per cent., the phosphorus in the ore must not exceed 0.001 per unit of metallic iron. Several large steel works keep to even lower limits. Greater latitude is permitted in fixing the sulphur content since much of the sulphur is removed by proper furnace management; 0.005 S per unit of iron in the ore is frequently allowed. A high percentage of iron and low silica are also important desiderata. In strict parlance a Bessemer ore is one which, smelted alone, with reasonably pure flux, will make a uniform quality of Bessemer pig. New Bed, Crown Point and Chateaugay, of Lake Champlain, and Tilly Foster, of Putnam County, N. Y., have been the only large producers of such ore in the Atlantic seaboard. If we expand the definition so as to include the calcined Hudson River carbonate and the roasted sulphur and copper-bearing magnetite of Cornwall, Pa., both of which are largely used in admixture with other more strictly Bessemer ores, the list of undressed ores in the eastern territory of the United States which have contributed in any considerable quantity to the Bessemer industry is complete. Excepting this small number of active producers, to which might be added a few minor contributors and several well-known but hitherto scarcely developed deposits of high grade magnetite, none of the iron ore bodies of the Atlantic States do in their crude condition satisfy Bessemer requirements. They are all either too lean or carry too much phosphorus—bnt not sufficient of the latter associated with a high percentage of iron, be it remarked, to yield any considerable output fit for basic Bessemer work. A wide and not unpromising field is therefore open for dressing enterprise.

The work that has been accomplished in this field is soon told. By means of simple sluice boxes or washing trommels, sometimes supplemented by old-fashioned, slow working jigs, the "washeries," which are dotted over many parts of New England and the eastern portion of the Middle States, separate gravel and ochreous clay from limonite. The work is often carried on by farmers in a small way, but the aggregate of ore so dressed is large. The washed product carries, however, with but very few exceptions, too much phosphorus—frequently in the form of intimately associated vivianite—to fit it for Bessemer furnaces, so that the treatment requires only the briefest notice here.

The magnetites which during many years supplied the active bloomary forges of Northern New Jersey and the Champlain district were always dressed. The demand for blooms, however, is steadily declining, and the advent of the basic open hearth is destined to effect a still further and marked restriction in their use, so that capital refrains from investing in new mills to supersede the primitive plants which have so long been used for dressing the bloomary ore. The practice of 40 years ago is that of to-day—the ore is partially calcined with wood in open heaps to make it friable; then it is stamped on a perforated cast-iron plate, and the fine broken stuff is sluiced, or jigged, without any attempt at previous sizing. This treatment enriches the ore from the 25 or 30 per cent. of iron it contains in its crude state to 65 per cent. of iron (= 90 per cent. magnetic oxide) in the concentrate—of course at the expense of no small loss of mineral in the tailings.

The first systematic concentration of iron ore in this country, so far as the writers know, was undertaken about 15 years ago at Iron Mountain, Mo. The process there, which was an outgrowth of the simple hand-jigging of surface fines, has since been developed to an excellent degree of efficiency by Prof. W. B. Potter, of Washington University. The Iron Mountain "surface ore" consists of decomposed porphyry carrying liberated grains and pieces of specular hematite. This surface ore and the mine dumps, which contain all the refuse derived from spalling and grading the underground or "mine ore," are hydraulicked *in situ* on a large scale to wash out a great amount of clay. The gravel and fines produced by this operation are still further cleansed in cone-washers. All material coarser than 1¼ inch is then hand-picked to form a finished product, while the finer stuff goes through sizing trommels which classify into ⅛, ¼, ½, ¾ and 1-inch sizes for jigging. Bradford tray jigs are used on all sizes but the finest, for which the more expensive Hartz plunger jig is preferred. The proportions of iron and phosphorus in the dressing ore fluctuate between wide limits; 300 tons of hydraulicked ore sometimes yield as high as 250 tons of concentrates, and, again, as low even as 50 tons. The separated ore runs about 65 per cent. in iron, and most of it is low in phosphorus, so that the dressing operation yields a Bessemer product. The phosphorus occurring as apatite in the gangue is washed away except where the apatite crystals are firmly imbedded in specular mineral, as is the case in some of the "spalls," when an actual enrichment of phosphorus has been found in the concentrates. The tailings carry from 10 to 25 per cent. of iron, according to varying conditions. Much of this iron is finely disseminated through the porphyry, while some of it is, of course, chemically combined with the gangue minerals; an average of 15 to 18 per cent. of uncombined Fe_2O_3 is, perhaps, as fair an average figure for the tailings as can be given. Three plants are now erected at different points of the iron property, with an aggregate 12-hour capacity of 600 to 900 tons (depending on the proportion of fines) of crude, hydraulicked ore. Each plant has two cone-washers, with a corresponding set of screens, and for each screen there are two jigs. The cost of dressing, including hydraulicking (but without crushing, which is unnecessary), varies from 40 to 70 cents per ton of separated ore; the average is about 60 cents.

In 1882 a separator was erected at Crown Point, N. Y., for dressing the low-grade magnetite of the Crown Point Iron Company. The mill is referred to by Mr. A. W. Wendt, its designer, in an illustrated paper* describing a similar plant (now idle) at the Thael mine, Putnam County, N. Y. The raw ore is crushed to ⅛ inch and sized for jigging, but it is remarkable that the sizing is confined to making only two classes of jigging ore, the coarser ranging from ⅛ to $\frac{1}{16}$ inch and the finer from $\frac{1}{16}$ inch down. Unless the ore possesses an open texture, so that very few "mixed grains" (part mineral and part gangue) are formed in crushing, such limited sizing must presumptively either restrict the capacity or lower the efficiency of the jigs. The average working is exhibited in the following figures:

Proportions.	Crude ore.	Concentrates.	Tailings.
Percentage of iron.....	33–35	65.00	20
Percentage of phosphorus.	0.03	0.02	—

The annual output of the mill amounts to 5000 tons of separated product, each ton being obtained from 2.8–3.2 tons of crude ore.

Six years ago the Chateaugay Ore and Iron Company began erecting concentrating works at their mines at Lion Mountain, near Plattsburg, N. Y. Their latest plant, a large and well-built mill, was put in operation in 1886. The lean dressing ore is a granitic rock carrying coarsely crystalline grains and aggregations of magnetite. Without any preparatory calcining it is broken down to ¼ inch in Blake crushers and multiple-jaw fine crushers. The crushed ore, most of which is much finer than quarter inch, is concentrated on Conkling revolving tray jigs, without size classification of any kind. The results of the dressing are shown below: 3–3½ tons of crude ore yield by concentration 1 ton of separated ore:

Proportions	Crude ore.	Concentrates.	Tailings.
Percentage of iron.....	35.0	65.5	18–22
Percentage of phosphorus.	0.025	0.015	0.033

At one time the concentrates were run up to 67 per cent. iron, but the higher market price then obtained did not compensate for the increased loss of iron in the tailings. At present, 63 per cent. are guaranteed, and the product is kept slightly above that figure. The new mill has a 24-hour capacity of 600 tons of crude ore. It is furnished with three large Blake crushers, feeding into three others that are wider but more closely set; it has also the usual rejecting screens and six multiple-jaw crushers each of which delivers to a Conkling revolving jig. The yearly output is upward of 50,000 tons of separated ore, much of which is shipped to Pennsylvania Bessemer furnaces.

At Negaunee, Mich., a large, costly concentrating mill was built five years ago to work the jaspery hematite of the Jackson mine. The extreme toughness of the ore was the cause of ruinously rapid wear in

* School of Mines Quarterly

* Transactions Am. Inst. of Mining Engineers, 1885, vol. xiii, p. 35.

the crushers and rolls;* besides this, the very intimate association of the mineral and gangue made any attempt at dressing the ore at best an extremely doubtful experiment. After a period of trials and failures the mill was closed, and it stands to-day a monument to the folly of embarking in a new enterprise of a technical character without submitting the vital question of feasibility to disinterested professional investigation.

This brief survey suffices to show that the field for economic high-grade concentration of iron ores has scarcely, as yet, been more than prospected. Only one company in the East—that of Chateaugay—is regularly shipping "separated ore" to Bessemer furnaces in large quantity, but its signal success with a very lean ore is certain to stimulate the owners of other deposits, more especially as the field is broad enough to accommodate many workers without crowding.

DRESSING TESTS.

Dephosphorization is not the particular aim of the Chateaugay work, as the crude ore there runs well within the Bessemer limit for phosphorus. But the removal of this baneful ingredient will often be the point on which success hinges. When it occurs only in the gangue, and not too finely disseminated, its more or less complete elimination by dressing is a natural and almost foregone conclusion. Concentrating tests that have recently been made by the writers bear upon this subject and point to possible favorable effects obtained by calcining. An account of the work may therefore interest some readers.

The first ore to be tested was that of the Beach Glen mine of northern New Jersey. The ore is a hornblendic granite, heavily charged with coarse grains of magnetite. The mine was carefully sampled, and after some preliminary tests with a hand-jig, a 20-ton average lot of lean ore was shipped to Chateaugay, where through the courtesy of Mr. Williams, president, and Mr. Inman, general manager, of the Chateaugay Ore and Iron Company, every facility was furnished for making a mill-run. The raw lump ore was passed through a rock-breaker into a Blake multiple-jaw crusher, set to ½ inch. As for special reasons close adherence to Chateaugay practice was desired, the ore was not sized further than to reject all pieces larger than ¾ inch. In this condition, the crushed rock was fed continuously to a Conkling jig. The work, when once begun, was carried on without interruption until the conclusion of the test, which occupied four hours. Samples of the crude ore running into the jig, and of the concentrate running out of the ore chute, were taken every two minutes. The tailings were sampled in the same intervals at the point where they discharged from the jig and also 25 feet distant in the waste sluice. Each sample was put through a Lucop mill, crushing through an 80-mesh screen, after which it was quartered down for analysis with the following results:

Table I.

	Crude ore.	Concentrate.	Tails at jig.	Tails in sluice.
Iron, per ct..	41.75	65.50	24.92	21.68
Phosphorus, per cent...	0.0643	0.0224	0.0799	0.0745
P. in pig iron, per cent...	0 1534	0.0342	.....	.....

These figures show an increase of 56.8 per cent. in the proportion of iron in the concentrate over that in the crude ore, and a decrease of 65.6 per cent. in the phosphorus. By this dressing, therefore, a non-Bessemer ore was raised to the Bessemer standard. On the other hand, the tailings run so high in iron that the yield, by weight, of the concentrate, as calculated from the above data, amounts only to 41.4 per cent. of the crude ore. In other terms, 2.4 tons of ore are required to produce 1 ton of concentrate. Even with this showing, at an estimated dressing cost of 25 cents per ton of crude ore, and allowing for the extra cost of mining 2.4 tons of rock to obtain only 1 ton of product, there are many localities where such ore can be worked to fair profit. With improved methods, particularly with systematic sizing, by which fine and coarse material are separated for jigging, better results will accrue. Moreover, the coarse-grained texture of many magnetic ores allows of their thorough disintegration without crushing down to ¼ inch, so that a portion, at least, of the dressed product will generally be of fairly coarse size.

The dressing of an Adirondack magnetite, exhibiting much finer mineralization than the New Jersey ore, presented an attractive, and, as it proved, an instructive problem. The rock is an intimate mixture of magnetite, hornblende, quartz, mica, apatite, and garnet; by simple microscopic examination it appears to be a hornblendic gneiss carrying a large proportion of magnetite. The intimate mixture of mineral and gangue pointed to fine crushing for disintegrating the ore, but as blast-furnace practice limits the fineness of the product, a condition was thereby imposed at the outset on any dressing operations. In making the tests about to be described, it has been assumed that ore sizes as fine as 16-mesh to 35-mesh could be marketed if mixed in small proportions with coarser material, but that all mineral reduced to particles finer than a 35-mesh size must be regarded as loss.

As only 1900 pounds of ore were available for experiment, the work was necessarily done on a small scale. The investigation began with a series of crushing and sizing tests, the purpose of which was (1), to classify the ore for subsequent jigging; (2), to ascertain the proportion of waste fines thereby produced; (3), to determine how this waste could be minimized; (4), to find, in connection with jig-tests, how coarse a grade of ore could be successfully concentrated.

Conclusions Upon Crushing.—From the foregoing crushing and sizing tests (given in detail in the original paper) the following conclusions with regard to the treatment of the ore were drawn:

1. The ore should be calcined sufficiently to make it quite friable and reduce very perceptibly the tendency to lamellar fracture. The advantages of calcining are: (*a*) making the ore so friable that it breaks up thoroughly in comparatively coarse passes of the crushing machinery, and in this way diminishes the production of waste fines; (*b*) increasing the friability of the gangue in relatively larger measure than that of the magnetite, and so raising the percentage of iron in the coarser jigging sizes, as shown by table VI; (*c*) increasing the capacity of the crushing machinery

Table VI.

Mesh.	6-8	8-10	10-12
Raw ore, percentage of iron	43.66	44.25	46 28
Calcined ore, percentage of.	50.19	50.19	49.03
Mesh.	12-16	16-20	20-35
Raw ore percentage of iron.....	46.42	....	....
Calcined ore, percentage. of	47 37	40.56	20.50

at least two or threefold; (*d*) correspondingly reducing the wear of the crushing machinery per ton of ore treated; (*e*) improving the shape of the ore grains for jigging, there being fewer thin flat pieces produced than in crushing raw ore; (*f*) reducing the percentage of sulphur by more or less complete oxidation of any pyrites present.

2. The calcined ore should be put through a large rock breaker, set to about 2 inches when closed, and then through 40 or 42-inch rolls, set to ⅛ inch, and capable of taking hold of the coarsely broken rock. The over-sized ore (coarser than 6-mesh) should be put through a second pair of rolls, set to ¼ inch; the small lot of ore which is refused by a 6-mesh screen after passing the second rolls should be returned to that pass.

By crushing calcined ore in this manner 83 to 85 per cent. of the total ore will be obtained in jigging sizes at a loss of waste fines never exceeding in practice 16 per cent. An analysis of an average sample of waste fines yielded 31.4 per cent. of metallic iron, which is less than three-fourths of the average iron contents of the ore, indicating, therefore, that in fine crushing the gangue breaks up more readily than the magnetite. Hence the production of 16 per cent. of waste fines means a loss not of 16 per cent., but only of 12 per cent. of the iron in the ore. As the latter contains according to the analyses of three separate samples an average of 44 per cent. of iron the actual loss by the production of fines in crushing will be 12 per cent. of 44, or 5.3 units of iron. This figure is a maximum, and it should not be difficult in good practice to keep within a lower limit.

Jigging Tests.—The classified ore obtained in the foregoing operations was sorted on a small two-compartment, fine-grain Hartz jig, with sieves measuring 7 x 18 inches. A mineral bed of magnetite, usually one size coarser than the particular ore class treated, was used upon each jig sieve. The heads and middlings passed through the sieves into the first and second hutches respectively, and the tailings overflowed the lower dam as usual. The products from each test were dried, weighed and carefully sampled for analysis. It was found by special determination that all the phosphorus of the ore occurred in the gangue, and this facilitated much of the analytical work. In order to obtain a fair quantity—say 65 to 100 pounds—of ore for each test it was found necessary in several cases to mix together the raw and partially calcined ore of the same sizes. This practice and reference to table VI will account for the varying percentages of iron in the undressed ore as hereinafter given in table VII.

The aim with which the tests were begun was to produce a Bessemer concentrate (Fe, 60 per cent. and over; P, 0.06 per cent. or less), and at the same time make tailings which would run sufficiently low in iron to permit of their being discarded without great loss. Four successive tests on 6, 8 and 10-mesh raw ore seemed to demonstrate the futility of any such attempt. The work was slowly and cautiously done on the first sieve of the jig, but with the invariable result that a 60-62 per cent. concentrate could not be produced without a loss of 21.25 per cent. of iron in the tailings. With such a showing it was evident that, at least in its coarser sizes, the ore could not be satisfactorily dressed without forming a middling product. The intimate mixture of the ore constituents, when considered in its bearing on the positive requirement for keeping to coarse concentrates, debarred the simplest solution of the dressing problem—*i.e.*, the direct separation of magnetite (specific gravity 5) from gangue (specific gravity 2.7–3.2). The experiments point to far more delicate work—namely, the separation of a high-grade magnetite, carrying not more than 0.06 per cent. of phosphorus, from a leaner product probably higher in phosphorus, which in turn has to be sufficiently freed from gangue to raise it to a marketable grade. Accordingly the aim of all further work was to produce for heads, a Bessemer concentrate; for middlings, a Foundry concentrate, and for tails, just as poor a product as possible.

One of the above-mentioned tests was made with 8–12 mesh ore. A close exam-

* It may be here said that the use of the steam stamp for crushing certain classes of iron ore deserves consideration. The Ball stamp in its old form, and as improved by Mr. Leavitt, has hitherto been used exclusively on the tough native-copper ores of Lake Superior. Recent experiments with one battery in crushing the copper sulphuret ore of the Anaconda Mine, Montana, have proved so satisfactory that the erection of nine more batteries is contemplated.

ination of the tailings revealed the presence not only of "mixed grains" (part mineral and part gangue) but also of many particles of 10–12 mesh magnetite which furnished additional argument, if any were needed, for the necessity of close sizing. The next eight tests on 6, 8, 10, 12 and 16-mesh ore served to determine the most favorable conditions for working the small jig on each of the several ore sizes. These tests were followed up by a second series, the results of which are given in Table VII.

Table VII.

	a.		*b.*		*c.*		*d.*		*e.*		*f.*	
Mesh.....	6-8		8-10		10-12		12-16		16-20		20-35	
Condition.....	Calcined.		Raw & Calc.		Raw & Calc.		Raw & Calc.		Calcined.		Calcined.	
	Fe	P	Fe	P	Fe	P	Fe	P	Fe	P	Fe	P
Ore.....	50.41	0.103	47.73	0.082	45.83	0.087	46.38	0.068	40.56	0.078	32.50	0.105
Heads.....	64.54	0.058	62.57	0.077	64.41	0.063	63.33	0.060	64.17	0.058	63.66	0.040
Middlings.....	55.82	0.098	51.44	0.094	57.58	0.080	58.47	0.072	49.84	0.093	43.25	0.157
Tails.....	12.82	0.110	16.31	.....	18.17	.....	12.67	0.058	5.95	0.063	4.86	.....

a.	89 pounds of ore jigged.	Proportion of heads to middlings	30.4 to 69.6.
b.	171 "	" " "	36.2 to 63.8.
c.	96 "	" " "	38.0 to 62.0.
d.	63 "	" " "	44.8 to 55.2.
e.	62 "	" " "	47.0 to 53.0.
f.	55 "	" " "	63.8 to 36.2.

An examination of this record shows the possibility of obtaining by jigging from all the calcined ore between 6 and 35 mesh the following products:

	Iron.	Phosphorus.
Heads.....	63 % and over.	0.063 % or less.
Middlings.	55 % and over.	0.095 % or less.
Tails.....	16 % and over.	.....

These figures are not averages computed from the table, but they represent results which are easily within reach of a laboratory jig. In practice, with large machines, heads running 64 per cent. iron and not more than 0.055 per cent. phosphorus ought to be obtained without difficulty from the calcined ore. The advantage of calcining in thereby enriching the coarser ore sizes has already been pointed out. It is the coarse sizes which are least easy to treat because of the large proportion of mixed grains present; the enrichment occurs, therefore, just where it proves of greatest benefit. Tests *b* and *c* would probably make a still better showing than they do if the respective ore classes had been composed of calcined stuff only.

Phosphorus is seen, by Table VII, to concentrate in the middlings, which is not surprising, as apatite is among the specifically heaviest of the gangue minerals, but the fact appears to indicate, also an intimate association of iron and phosphorus in the "mixed grains" of the foundry concentrate. The presence or absence of sulphur was disregarded in the tests, as the amount of sulphur reported in the ore had no economic importance.

As previously observed, the jig products of each test were weighed (dry) to check results, but it would obviously be wrong to deduce from these weights the quantities of concentrates and tailings obtainable in practice. The partly jiggled ore upon the sieves is a disturbing factor of appreciable magnitude in the laboratory results. It cannot be eliminated by simple subtraction. The quantity of concentrates—heads as well as middlings—formed in an experimental test with a small lot of ore evidently depends in large measure on the ratio of the total weight of the test lot to that required for filling the sieves. It is only the comparative proportions, therefore, of these two grades of concentrates, obtained in the laboratory, which deserve attention; with due reservation they serve to approximate the quantitative relation between heads and middlings in practice. In seeking to determine a fair average of these proportions, the gradually increasing ratio between the successively finer products of the experimental heads and middlings cannot escape notice. The change is evidently due to the smaller percentage of "mixed grains" in the finer, more thoroughly disintegrated ore classes. Figuring upon the results of table V, it appears that 15.6 per cent. of all the jigging ore would in practice be 20–35 mesh stuff. This alone, as can readily be seen, would raise the proportionate production of heads appreciably; in the present case, however, it was thought preferable to attach but little weight to this favoring circumstance, and rather adopt figures which were well within the mean of results obtained with the coarser sizes. A proportion of heads 36 per cent., to middlings 64 per cent., was taken as a conservative basis for computing practical results.

Conclusions upon Jigging.—The data for estimating the yield per gross ton of ore may be recapitulated as follows:

	Per Cent.
Raw ore averages.....	44 iron
Waste fines.....	16 ore
Heads average.....	63 iron
Middlings average.....	55 iron
Tails average.....	16 iron
Percentage proportions of heads to middlings.....	36 to 64

By sifting out the poor waste fines produced in crushing, the raw jigging ore is enriched to 46 per cent. iron. The additional enrichment of the coarser sizes by calcining is balanced by the impoverishment of the finer classes, and hence does not enter into the calculation. One gross ton of mine ore therefore yields:

	Lbs.	Per Cent.	Carrying lbs. Iron.
Waste fines.....	359	16.0	178
Bessemer concentrate....	484	21.6	305
Foundry concentrate....	860	38.4	474
Waste tails.....	537	24.0	86
Total.....	2,240	100.0	983
Unaccounted through discarding fractions.....			2

44 per cent. of 2,240 = 985

A ton of concentrates (Bessemer and foundry) would by these figures be obtained from 3730 pounds, or 1.66 tons ore.

The limited quantity of material available for the foregoing experiment precludes any generalization upon the results; but as these will at least prove suggestive, they have not been considered unworthy of record.

At Birmingham, Ala., on the 19th ult., Mr. James Henderson put the blast on his open-hearth furnace, and was gradually heating it up. He uses Cahaba County coal, which does not cake, and contains 37 per cent. of gas, using 6000 pounds in 24 hours. He expects to melt in one chamber of the furnace and desiliconize and partially decarbonize, employing Red Mountain ore on a sandstone hearth. This operation, it is expected, will take three hours. The metal is then run into the steel-converting chamber, where it will be converted into steel in three hours. During the conversion iron will be melting for the next charge, so that, it is claimed, eight charges of 2½ tons each will be obtained in 24 hours. The converting chamber will be lined with the raw dolomite found on the premises, mixed with 2 per cent. of fluorspar. This is placed over a lining of silica brick, separated by chrome ore, as is usual in Europe. Mr. Henderson believes that enough of the lining will wear away to furnish a basic slag of lime and phosphoric acid to absorb what phosphorus is not volatilized. He intends to use pig iron at hand which contains 0.75 to 0.80 per cent. of phosphorus, which costs $10 a ton. Coal is $1.75 per ton and the waste heat of the furnace is expected to supply enough heat for all uses connected with the furnace. Our Birmingham correspondent telegraphs as follows: "The Henderson Steel Works, of Birmingham, Ala., using Henderson's adaptation of the flame process to the basic Bessemer made their first run on 27th ult., turning out nearly a ton of steel from a ton and a half of Mary Pratt white iron, costing $10 a ton at furnace. Nearly as much steel would have been made, Mr. Henderson says, but for the melting of lining of converters. For the sake of economy, he had made lining of lime rock instead of calcined lime, and it didn't stand the heat. Work was begun next day on relining, and as soon as it is completed the furnace will be put in regular operation. The steel is apparently of good quality, and stockholders already regard the enterprise as a substantial success."

Pacific Coast Steel.

The *Mining and Scientific Press*, of San Francisco, prints some data concerning the quality of the steel made for the Navy by the Pacific Rolling Mill Company of that city.

The tests of the steel were made by Lieutenant Gilmore, U. S. N., who was sent by the Government on special duty during the construction of the cruiser Charleston. Four test pieces are taken from each heat. In the following table, which is from official records, the figures of the *average* of each of the four tests are given:

Material.	Tensile strength per sq. inch.	Elongation. Percentage.
Angles.....	61,505	29.70 in 8 in.
Angles.....	60,830	30.54 in 8 in.
Angles.....	60,905	30.21 in 8 in.
Angles.....	60,175	30.37 in 8 in.
Hull rivets.....	54,265	31.09 in 8 in.
Hull rivets.....	53,215	31.43 in 8 in.
Hull rivets.....	52,445	31.80 in 8 in.
Boiler shell rivets.....	60,250	28.07 in 8 in.
Boiler shell rivets.....	61,410	29.90 in 8 in.
Boiler shell rivets.....	61,990	29.90 in 8 in.
Stay rods.....	65,880	24.03 in 8 in.
Miscellaneous forgings.	68,127	24.87 in 4 in.
Cast steel stern-post...	74,670	19.75 in 3 in.
Cast steel ram.....	64,370	18.12 in 8 in.
Cast steel stem.....	61,580	19.20 in 3.2 in.

The angles are the frames for the ship. The results obtained in ductility are much in excess of that required by the specifications, the requirements being 25 per cent. in eight inches. The case is similar with the hull rivets. The quality of the rivet material is shown by the fact that no rivets have been lost after being driven into the ship. With ordinary material more or less are broken or defaced. The stay rods are for the boilers. The miscellaneous forgings of steel are used in making different parts of the engines, &c.

Walter Kennedy has resigned his position as manager of the Lucy Furnace, at Pittsburgh to accept that of assistant-superintendent of the Isabella furnaces at that city. The assistant-superintendent of the Isabella furnaces, John W. Higgs, leaves on March 1, to take charge of the Rising Fawn Furnace, at Rising Fawn, Dade County, Ga.

Roofing, Past and Present.

At the session of the National Master Builders' Association, in Cincinnati, recently, an interesting paper on roofs, past and present, with a glance at recent improvements in roofing, was read by Mr. Edward E. Scribner, president of the Scribner-Libbey Company, of St. Paul, Minn. We make the following extracts:

To trace the direction in which improvements and advances have been made in roofing is comparatively easy, so long as the inquiry is restricted to general lines. The question becomes complicated, however, when details are entered into. Restricting the inquiry to the most general terms, the kinds of improvements made in roofing of late years are principally those which cause the same material to be furnished at a less price than formerly, growing out of the substitution of machine work for hand work. A conspicuous example of this is found right here, in Cincinnati, the home of the iron roofing industry. I do not know how many tons of iron roofing are annually produced here; but it is sufficient to say that the industry is second in importance to no other of its general class. To such perfection has the business been carried, that iron roofs are manufactured and sold at a very small advance upon the cost of the material in the flat. Other instances might be cited, an extreme case being the comparison of the price of shingles at the present time, with those known to a previous generation. The sawn shingles of the lumber regions of the North cost but a trifle compared with the slabs laboriously wrought by axe and draw knive 50 and 100 years ago, when the eastern and central parts of the country were on the outposts of civilization.

Another phase of the improvements and advances that have been made in roofing is the better knowledge that exists at the present time concerning the materials that are used for roofing and their behavior under adverse conditions. The technical knowledge of roofing manufacturers and those who make a business of laying roofs at the present time is far in excess of that of any previous age of the world. Roofing in all the leading branches of the trade is no longer an experiment, but it is reduced to a definite science and results can be accurately predicted.

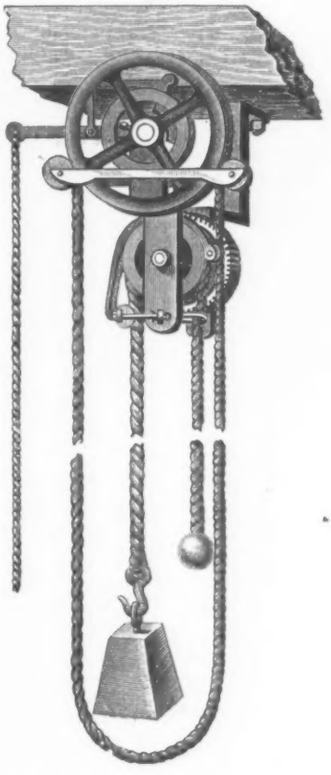
While dwelling upon the improvements and advances made in roofing, I should be doing an injustice to a large class among the practical roofers of the country and those engaged in handling roofing materials if I did not refer to the improvements which have taken place, in the last few years, in tin plates. Formerly it was almost impossible to buy a respectable roofing plate, no matter what price the roofer might be willing to pay, nor how carefully the architect drew his specification. Now I am persuaded that the very best quality of plates can be obtained without difficulty. Carrying the inquiry a little further and carefully questioning those who handle roofing plates constantly, I am assured that better plates are being imported at the present time for roofing purposes than were ever brought to this country before. One evidence of this is in the fact of the guarantees which importers unhesitatingly apply to their plates and the care with which they brand individual sheets and mark the weights upon the packages. All this indicates good faith and is a matter of congratulation to the building trades at large.

One of our English contemporaries illustrates an improved form of flexible boiler stay brought out in India a short time ago. The flexible portions consist essentially of a wrought iron stay, with a head forming a portion of a sphere on the inner side, a wrought iron bush screwed into the boiler shell and formed to receive the head of the stay, and a copper seating between the head of the stay and the seating in the bush. A cap is added to prevent the escape of any steam that may escape through the joint. The whole forms a gas-bracket joint, giving freedom to the stay to swing for some distance in every direction. These stays, we are informed, have been in use for over three years on the Rajputana Malwa Railway, India, and upward of 20,000 of them have been put in to replace the copper stays—which give continued trouble—with most successful results.

Improved Rope Hoist.

The Energy Mfg. Company, 1115–1123 South Fifteenth street, Philadelphia, Pa., are putting on the market an improved form of rope hoist, of which we annex an engraving.

The hoist was specially designed for use in hatchways, and appears to meet the demand for a rapid, cheap hoisting arrangement to be used in raising and lowering goods from floor to floor where the business does not warrant the expense or space admit of a large platform hoist or elevator. The structure is compact and readily used where there are low ceilings, the extreme length being only 22 inches. A platform or cage can be easily attached. The gearing is fitted into a cast-iron frame which is bolted to the ceiling. There are few parts to wear or get out of order, and they are all in sight and easily replaced. No skill is required to place the apparatus in position. In raising, the load is held at any point by means of an automatic brake, and the speed of lowering is either slow or fast, being under the entire control of the operator and governed by a slight pull on the brake rope. One man can easily work the hoist. The rope cannot slip, cut nor leave the wheels at any time. The hoists are at present made in two sizes, one of 500 and the other of 1000 pounds capacity.



Rope Hoist, Made by the Energy Mfg. Co., Philadelphia, Pa.

Drawback on Exports.

The following is one of the bills just presented to Congress to allow a full drawback on exports:

An act to amend the statutes relating to the allowance of drawback on exports of domestic manufactures.

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That on articles manufactured in the United States wholly of imported materials and exported, there shall be allowed a drawback equal to the duties paid on the materials used and no more.

In case any part of an article so manufactured and exported be made wholly from imported materials, and be so distinctly separable from the other part or parts of the article that its measure or quantity may be ascertained, a drawback shall be allowed on that part equal to the duties paid on the materials used in its manufacture and no more.

On gunpowder made from imported saltpeter and exported there shall be allowed a drawback equal to the duty paid on the imported saltpeter used and no more.

The quantities of materials used in the manufacture of articles entitled to drawback when exported and the amount of duties paid thereon shall be ascertained, the fact of the exportation of such articles shall be determined and the amount of drawback due thereon shall be paid under such regulations as may be established by the Secretary of the Treasury. Such drawbacks shall be paid out of any moneys in the United States Treasury not otherwise set apart or appropriated.

The provisions of this act shall repeal and take the place of sections 3019, 3020 and 3026 of the Revised Statutes, section 10 of the act of February 8, 1875, entitled "An act to amend existing customs and internal revenue laws," &c., and all laws providing for the retention of any part of the drawback allowed on exports of articles of domestic manufacture.

Mr. William Forsyth, of the Chicago, Burlington and Quincy Railroad, in arecent lecture on locomotive designing, presented an interesting diagram giving train resistances at different speeds. From it we compile the following table:

Speed in miles per hour.	Resistance in pouns. per ton.
10	6.6
15	7.3
20	8.3
25	9.6
30	11.2
35	13.1
40	15.3
45	17.8
50	20.6
55	23.7
60	27.0
65	30.7
70	34.6

The Addyston Pipe and Steel Company, formerly the Cincinnati and Newport Iron and Pipe Company, whose main office is in Cincinnati, contracted six weeks ago for two generators to make fuel gas by the Loomis system for their pipe works at Addyston, Ohio, and Newport, Ky. Within a few days they have contracted for the erection of four more generators under this same system. They will use the gas for all purposes in connection with their works wherever gas can be applied. J. K. Dimmick, superintendent of the company, examined a number of fuel gas systems in this country and in Europe before determining to contract for the Loomis system.

The Southern Railway and Steamship Association has fixed pig iron freights for March on the basis of $3.35 from Birmingham to Cincinnati, and $2.85 from Chattanooga to Cincinnati.

A New Engine Lathe.

We present in this issue engravings of a newly designed engine lathe, built by Messrs. Nicholson & Waterman, of Providence, R. I., and intended for general shop use, to do heavy or fine work, as occasion may require.

The general view, Fig. 1, shows a 16-inch 8-foot lathe, embodying all the new features. Considered in detail, the lathe consists of a very heavy stiff bed braced at every two feet with solid cross ties and designed bed directly under K.″ This tie and the bed are carefully planed, and presenting as they do broad, flat surfaces, but little force is needed at W to securely lock the tail-stock. The advantage of this form of tail-stock is in the quickness of tightening and loosening, together with a positive grip. The operator is able, with a quarter turn of the wrench, to entirely free or securely fasten. For moving the top of the stock for taper work the screw V, Fig. 5, is used. This screw, traversing a nut attached to part of the lower portion of the stock, moves the top in either one direction or the other, as the screw is turned from right to left and from left to right. The spindle can be locked by the handle and screw T. So thoroughly is this spindle fitted that but ¼ of a turn of the handle T is needed to entirely release it, or to bind it so fast that no force applied at U can move it. Those familiar with the practical uses of the lathe, both on fine and very heavy work, will at once admit that if any portion of a lathe is of greater importance than another it is in the head and tail stock spindles being true and immovable except as intended, and this is obtainable only by the most careful fitting.

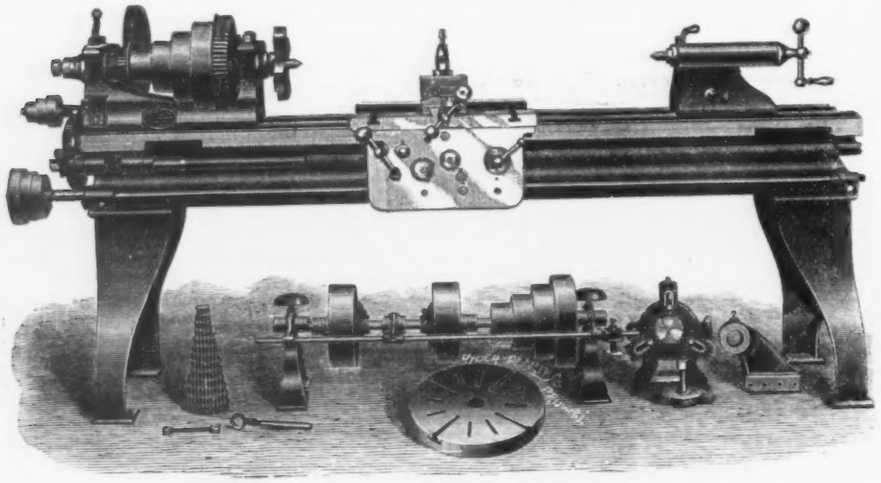


Fig. 1.—General View.

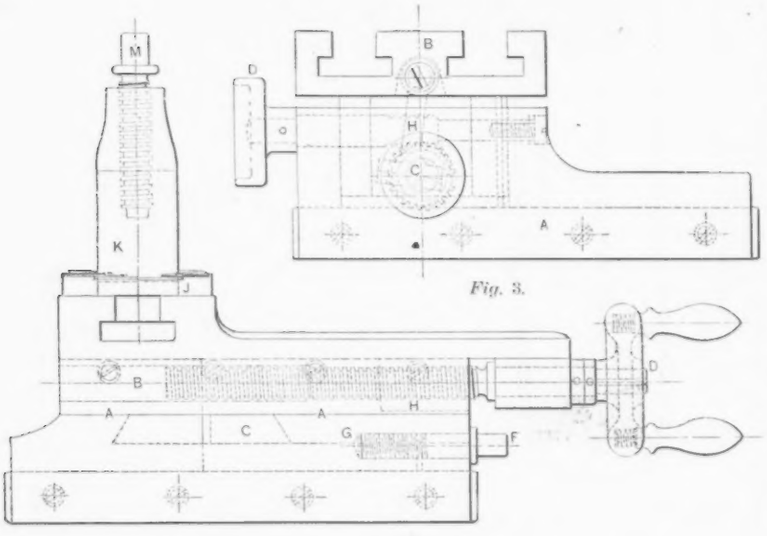


Fig. 2.

NEW ENGINE LATHE, BUILT BY MESSRS. NICHOLSON & WATERMAN, PROVIDENCE, R. I.

Fig. 4 shows the head-stock end of the lathe. Two gears are attached to the cone shaft or spindle. One is used when the back gears are thrown in, and the second or end gear driving the reverse motion gears. This motion is controlled by the handle C, moving on the outside of the frame and held in position by the pin C″, which is driven in one of the holes by a spring. By moving the handle down or up the gear F may be made to revolve either to the right or the left as required, or, if the handle be stopped in the middle and the pin C″ dropped into the center hole the motion will cease in either direction and allow the spindle and cone to revolve independently. The shaft F is provided, first with a gear in line of the change gear G, and second with a small cone in line with the cone D on the feedrod. The gear G meshes, and is in line with the gear H on the feed-screw, and is thrown in or out of contact with F by the lever and handle B, held in place by the binder A, gripping upon the arc. The carriage R is carefully scraped and fitted to the ways. At J, at the back of the carriage, between and under the ways K″ K′ the gibbs are placed for holding the carriage. The cross-feed screw is moved by the handle P, or, when power feed is desired, the handle M is turned, drawing into place a lock binder which sets in motion a set of gears connected with the shaft P. The handle N is used to engage the friction disk for throwing in or out the rod feed. This consists of a worm driven by the shaft and driving a set of gears, the last of which meshes into the steel rack under the front of the top of the bed. The handle O drives a small pinion, meshing with the large gear just mentioned as connecting with the rack. For connecting the feed screw to the carriage a split nut is used, the upper and lower halves of which are drawn together or forced apart by the handle S. This is shown at the extreme right of the apron in Fig. 1. The intention has been in designing this apron to make it thoroughly effective and yet to avoid those motions which are liable to breakage or inaccuracy either from careless workmanship or rough usage.

Fig. 2 shows a side view of the compound rest employed by Messrs. Nicholson & Waterman on all sizes of their lathes. It consists of a base gibbed to the carriage and extending to the line A. The screw F presses against G, which in turn bends the swivel piece when the desired amount of throw is obtained. Above the line B is the top, shaped to hold the tool post and depressed at H to serve as a nut for the screw D. The handle of this screw is nicely keyed and fitted loose enough to be readily pulled off or reset in case the compound feed should interfere with the regular cross feed handle. The ring J, the post K and the screw M are all case-hardened.

While for all large sizes of lathes the compound rest is preferable when the swing does not exceed 18 inches, there are many uses where the smallness of the work renders it less advantageous and makes the up and down adjustment more important. For this purpose Messrs. Nicholson & Waterman employ the rest shown in Fig. 3. The base A is gibbed to the carriage in the same way as the compound rest. The tool post holder B is square on the top. The lower portion consists of a cylinder carefully fitted to the base A and sliding perpendicularly. By means of a connection, H, pivoted in the center and top of the cylinder of B at one end and attached to the eccentric shaft C at the other, the whole of B is raised or lowered by turning the handle D, which, through the worm and worm shaft shown, turn the ec-

centric. The rear side of the base A is split from the eccentric C to the top, and a binding screw, located back of D, and shown only at the right of this rest in Fig. 1, is used to secure the piece B when very heavy work is being performed. The advantage of this rest is—first, that all travel of the tool is in right lines, and, second, that the fullest swing of the lathe is obtained.

The lathe itself is built with the utmost care. All the spindles are ground on dead centers and the boxes are carefully scraped. Every sliding surface is equally carefully scraped and every part can be duplicated.

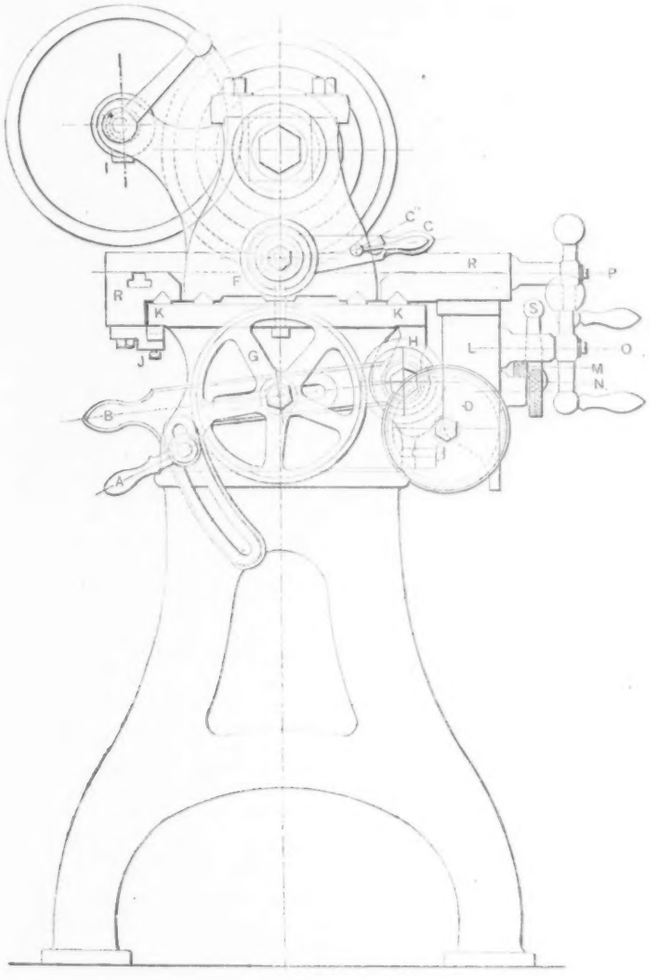


Fig. 4.—Head Stock End.

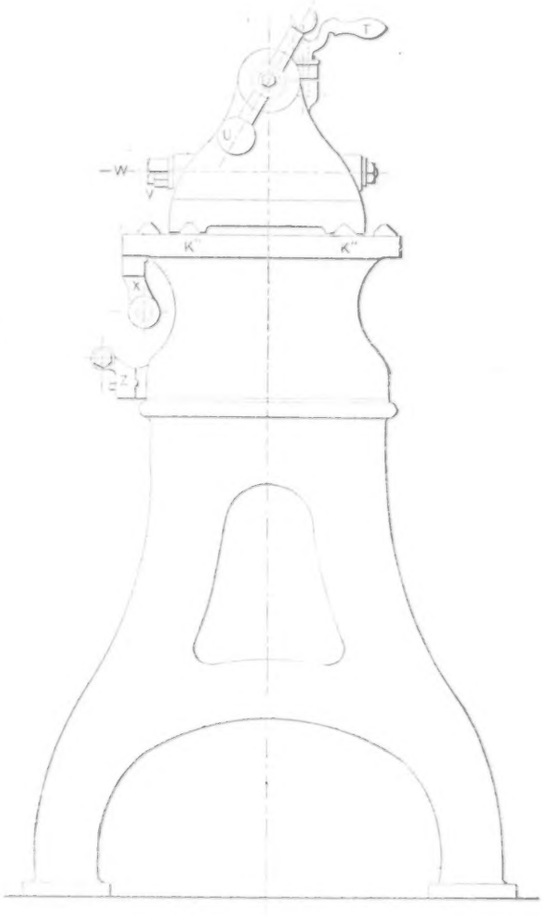


Fig. 5.—Tail Stock End.

NEW ENGINE LATHE, BUILT BY MESSRS. NICHOLSON & WATERMAN, PROVIDENCE, R. I.

The head-stock spindle runs in composition boxes. The front bearing is 4½ inches long by 2¼ inches diameter, the rear bearing being 3½ x 1⅞ inches diameter. Both of these bearings are carefully ground and scraped. The tail-stock spindle is 13 inches long, 2 inches diameter and has a bearing its full length. Every lathe, moreover, is furnished with a friction countershaft of special design. By means of special appliances and by building in large lots, these tools, we are told, are turned out at a comparatively low price when the high quality of workmanship and material is taken into consideration.

The agricultural outlook in California was never more promising, and the harvest, it is predicted, will be the largest since 1880. Grain and grass are well started, and the fruit buds are "pouting in their fullness."

Reduction in the Price of Coke.

The demand of the blast-furnace owners for a reduction in the price of coke has at last been recognized, and a reduction in the price of that article, which enters so largely into the manufacture of pig iron, has been made. An important meeting of the Connellsville coke operators was held in the rooms of the old syndicate in the Lewis Block, Pittsburgh, on Thursday, the 23d ult. Representatives were present from nearly all the important works in the region. The present selling price of coke was the first subject brought up for discussion, and, after careful consideration, in which the present depressed condition of the pig iron industry was fully discussed, it was unanimously decided to reduce the price of coke to furnace owners to $1.50 per ton, to dealers $1.69 per ton, and to foundries $1.75 per ton—these reductions to take effect on March 1. It is a reduction of 25 cents per ton. The question of the formation of a new coke syndicate, which has engaged the attention of the operators for two or three months, was also brought up, and it was announced at the meeting that the prospects for the formation of the syndicate were brighter than for some time past. While it is possible that a syndicate may be formed, the fact remains that so many statements have been confidently made in the past, this last announcement will be received with considerable allowance. As we have before stated in *The Iron Age*, it will be practically impossible successfully to form a syndicate until all the operators in the region have agreed to join it, and there are several large operators who have not as yet signified their willingness to go into the pool. One of these is W. J. Rainey, one of the largest independent operators in the region. Should a syndicate be formed it will be known as the Pittsburgh and Connellsville Coke Exchange, and will consist of five firms, instead of four, as formerly, viz.—H. C. Frick Coke Company, J. M. Schoonmaker Coke Company, McClure & Co., Connellsville Coke and Iron Company and the J. W. Moore Coke Company. The last named concern will represent all the members of the old Producers' Association, representing about 3000 ovens. The resolution adopted at Pittsburgh on Monday, the 13th ult., and which went into effect on the 16th of last month, to close down 25 per cent. of the ovens, has already materially affected shipments. Last week they aggregated 4450 cars, distributed as follows: West of Pittsburgh, 2675; East, 900; Pittsburgh and Rivers, 875. The daily shipments average about 740 cars, against 1100, the capacity of the region. The failure of Graff, Bennett & Co., has stopped the shipment of 20 cars daily to their Clinton furnace at Pittsburgh and the Graffton furnaces at Leetonia, Ohio. The larger firms have blown out one-fourth of their ovens, while the independent operators have not more than 400 ovens in operation. The total number of idle ovens is estimated in round numbers at 3500, or 30 per cent of the entire region.

The American Institute of Mining Engineers.

ANNUAL MEETING AT BOSTON.

The forty-fifth meeting of the American Institute of Mining Engineers was held last week at Boston, and proved to be in all respects one of great interest. The programme offered many and varied attractions, and the attending members and guests, numbering nearly 200, were offered every facility for visiting prominent establishments in the city and vicinity.

The Opening Session.

The opening session was held on Tuesday evening, February 21, at the Hotel Brunswick, which was the headquarters during the meeting. Prof. R. H. Richards introduced Gen. Francis A. Walker, of the Massachusetts Institute of Technology, who delivered a brief address of welcome, to which President Thomas Egleston, of the Institute of Mining Engineers responded.

Dr. Egleston continued with the annual presidential address for which he had chosen the subject "Education," reviewing the past and present condition of educational institutions in this country, with special reference to engineering schools, the progress which had been and is being made in the matter of suitable preparatory schools, not omitting, finally, the hackneyed, worn-out subject of manual training. Attention was also given briefly to foreign methods of instruction, the characteristic features of French and German systems being pointed out. Technical education in the United States differed in principle from all other methods, being, in fact, a combination of what appeared to be commendable features in several European systems now practiced. Dr. Egleston further urged the necessity of instruction in engineering designs—the designs to be for some practical purpose—and the desirability of museum instruction by which education of the eye and hand was to be secured.

These preliminary proceedings were followed by a paper by Mr. James C. Bayles on

SPIRALLY WELDED TUBING,

describing the manufacture of pipes from strips of steel or iron skelp wound spirally, heated only along the overlapping edges, welded by hammering and finished into pipe of uniform diameter and of such length as may be found convenient in handling and transportation. Such pipes are now manufactured on a considerable scale in East Orange, N. J., of sizes which will soon include everything between 4 inches and 30 inches, and as much larger as may be needed. The process and product are likely to be of interest to engineers in all departments of professional work. The raw material of the industry is the ordinary sheet iron or steel of commerce, of such length and width as it is convenient to roll. The range of the gauges of metal which can be employed has not yet been determined. The lightest metal thus far successfully made into pipe is No. 29 iron, and the heaviest No. 14 steel. Heavier machines are now building which will bend steel 0.165 inch in thickness, or No. 8 of the Birmingham gauge. Probably No. 20 or No. 22 will be the lightest used in making commercial pipes. To get a welding heat with such thin metal and not burn or fuse it, is a delicate operation. The gauge of stock which may be used when great strength is desired depends upon the diameter of the pipe, the stiffness of the material and the rate of speed desired in running the machine. Heavier metal can be used in an 8 or 10-inch pipe, than in one of 4 inches, as the greater radius of curvature involves less difficulty in bending and forming it. The range of practicable gauges is wide enough to meet all the requirements of strength in ordinary service. The heating of the pipe is secured by one or two blow pipes of water, gas and air. A special machine is used for welding. Mr. Bayles believes that there is a large and unsatisfied demand for sizes of wrought-iron and steel-pipe for uses in which cast iron is too costly or cannot be trusted, which seems to be fully met by the spirally welded tubing.

In discussing this paper Mr. Henry M. Howe directed attention to another method of making spirally arranged pipes, practiced at Providence, R. I. The joints in this pipe, however, are not welded, but soldered, two layers of skelp, one on top of the other, being used. The skelp is wound upon a mandrel which dips in molten solder, and the resulting tubing is perfectly true and applicable to a large variety of purposes. These, however, as Mr. Charles E. Emery pointed out, differ from the uses to which the spirally welded pipe, described by Mr. Bayles, is to be applied, the manufacture of gun-barrels, for example, being a line of work in which the soldered tubing might possibly be used to advantage. It can be built up to any reasonable thickness desired. Bearing on the subject of welding iron and steel, Mr. J. F. Holloway referred to the welding of boilers and other heavy work now accomplished at the Continental Iron Works, at Greenpoint, L. I. As regards the friction of fluids in the spirally welded pipes, due to a projecting helical burr at the line of welding on the inside of the pipe, samples of which were exhibited, Mr. Bayles explained that this burr could be easily avoided.

The second paper of the evening was by Dr. R. W. Raymond, on "New York Mining Laws." Dr. Raymond presented in an interesting manner some of the peculiar laws pertaining to mining in the State of New York, which had been enacted many years ago, some of them being traceable back to colonial times. Special interest was centered in the definition of precious ores, there being a provision that where an ore contained copper, tin, iron and other metals in addition to gold or silver, and where the precious metals constituted more than one-third of the whole, the ore was precious, and *vice versa*. New York is the only one of the States where such laws are in existence. A few announcements were then made by the secretary of the local committee, after which the meeting was adjourned. The remaining part of the evening was given up to the pleasures of a social gathering and a supper provided by the local committee.

Wednesday, February 22.

The morning session was called to order at 9.30 o'clock in one of the lecture rooms of the Massachusetts Institute of Technology, the first paper being on "The Construction of Geological Maps," in which a simple method was described of illustrating the different geological sections. Following this came a very long paper, by Mr. A. D. Hodges, on

THE TOPOGRAPHY AND GEOLOGY OF THE CERRO DE PASCO, PERU.

It appears, from what Mr. Hodges said, that the great mining region of Peru is a mountainous belt of country running nearly the whole length of the republic, and comprising the two grand ranges of the Andes, with the elevated table lands between them. On the east of this belt are the extensive plains and fertile valleys of the Amazon and its tributaries. On the west is a narrow strip of coast, 20 to 50 miles wide, a sandy desert. Here are found petroleum, salt, copper and other minerals. The western Cordillera is nearly parallel to the shore line, and runs like a wall on the eastern side of the coast belt, its peak attaining 1500 to 2000 feet in height. Further east is the eastern Cordillera, parallel to the western chain. The surface of the plains between is uneven and traversed by low ranges of hills which surround large lakes or rolling pampas. As yet only one railway, the Arequipa Puno, traverses its realms. In all parts of this region are deposits of valuable gold and silver; the quicksilver mines are now practically abandoned; lead and copper have been mined to some extent; salt and coal have also been found. In spite of the drawbacks of bad roads, want of proper methods and appliances, and lack of skilled labor and of capital, this region has produced an annual average of $5,300,000 in gold and silver. The population of Cerro de Pasco is from 7000 to 8000. The town consists of buildings of stone and adobe, with tin or thatched roof, and one or two stories high. The dwellings of the working class consist generally of one room without window, and heated by miserable fires of peat. There are one or two native smelting furnaces which have periodic spasms of activity. The paper was accompanied by charts illustrating the location of the different points of interest.

Mr. R. P. Rothwell then presented an account of a system of

MINING IN LARGE BODIES OF SOFT ORE,

describing first the methods followed in the Lake Superior and Gogebic mining regions. Referring especially to the Chapin mine, Mr. Rothwell prepared a blackboard sketch showing the system there followed of working from the bottom upward, filling up the drifts after having taken out the ore. The whole upper mass having a comparatively poor support, is difficult to hold, and eventually moves downward, a constant menace to the miners. The filling up is done with any available waste material, and the timbering employed costs about 50 or 60 cents per ton of ore extracted. To overcome this, Mr. Rothwell suggested the very simple plan of working such deposits from the top downward. The method, it may here be remarked, is not entirely new, having been practiced in England, and, with some modifications, at the Longdale mines in Virginia. A long paper, entitlsd "The Formation of Fissure Veins," wae then read by Mr. S. F. Emmons. This was followed by an account of

RECENT MINING ACCIDENTS,

by Mr. Charles A. Ashburner, in which reference was made, among other things, to the report of the British Commission on Mining Accidents. This showed that for a period of 10 years the fire-damp accidents in England amounted to 23 per cent. of the whole, while in the Pennsylvania anthracite regions in one year of 302 fatal accidents only 5 per cent. resulted from gas. Mr. Ashburner further pointed out that much more attention was paid in England than in America to the inspection of mines. In some of the States mining laws existed, and these provided for inspection, but there was too often no money or appropriation with which to carry out the work of inspection. Again, there was frequently no restriction upon the business of mining. Any one in Pennsylvania who had $100 could go into the business without a mining engineer. In the discussion which followed Mr. Eckley B. Coxe urged the desirability of recording accidents per 1,000,000 tons of coal mined, since under the present plan the figures are extremely misleading and afford no true measure of comparison.

The afternoon session was opened at 2.30 o'clock with a paper on

THE APPLICATION OF ELECTRICITY TO MINING,

by Mr. Mansfeld, the paper beginning with an exposition of the elementary prin-

ciples of dynamos. As an instance of the degree of practical development which the application of electricity to various purposes had attained Mr. Mansfeld stated that Boston now had in use some 3000 arc lights, requiring 2500 horse-power. In transmitting power electrically through long distances M. Marcel Deprez had, in France, attained an efficiency of 56 per cent. and the Thompson-Houston Electric Company, in this country, it was claimed, reached as high a figure as 90 per cent. in ordinary working. The subject of the paper was treated under a number of different heads, such as drilling and excavating by electricity, both of which operations had been successfully accomplished; hauling, as, for example, in the case of street railways; transporting, by the telpherage system, which we have repeatedly referred to in the columns of *The Iron Age*, the transporting buckets for this purpose being hung from small trucks running on the electric wires, which are strung along poles; pumping, ventilating, &c. For mining work Mr. Mansfeld considered electrical methods better adapted than any of the systems now in use and predicted their early extensive introduction. In the resulting discussion of the paper the question of danger to life in mines from electric transmissions was given prominence, though, in some respects, the application of electricity was considered favorable. Mr. Eckley B. Coxe, of Drifton, Pa., considered electric underground haulage an assured success and stated that they would use it in their coal mines in the near future, the Pennsylvania Coal Company already employing it successfully in their mines. Mr. Charles E. Emery stated that he knew of one or two companies who build electric motors giving an efficiency of 96 per cent. He had some experience with electric power systems and thought it beyond question that they were cheaper than other methods. The multiplication of devices, however, to secure the desired result made the final cost prohibitive. In a case where power was to be transmitted through a distance of 14 miles it was found cheaper to use compressed air

The next paper in order was on

RECENT DEVELOPMENTS IN THE OPEN-HEARTH PROCESS.

by Mr. A. E. Hunt, of Pittsburgh.

In this a series of interesting figures was given, representing results of a number of experiments which had been made with a new form of direct process. The ore was mixed with what has been called Rhode Island anthracite, practically graphite, in the proportion of 2240 pounds of ore to 500 pounds of the graphite, and reduction was effected in a furnace under the action of natural gas jets. The paper was briefly discussed, some surprise being manifested that a process so obviously opposed to good practice should yield satisfactory results, as the tests seemed to show.

Mr. E. Lynwood Garrison followed with a paper on

THE HUSGAVFEL FURNACE FOR MAKING MALLEABLE IRON.

briefly described in our columns on a previous occasion.

Mr. Garrison's paper gives at length the observations made by him during a long visit in Russia last summer of the new furnace which has been introduced at a number of points in Finland and Russia, tracing the development of the furnace from the first built at Porsaskoski in 1876 through its various stages of development, and illustrating the furnaces built at Pankakoski in 1880, at Porsaskoski in 1882, at Wärtsilä, in Eastern Finland, near Lake Ladoga, and at Dobriansky in 1886 He prints a number of details concerning the production of the Wärtsilä furnace as follows: With a charge of lake ores the product of malleable iron averaged 3 tons in 24 hours. On a charge consisting of a mixture of 60 per cent. lake ores and 40 per cent. puddle slag the mean was 2.64 tons and from puddle slag alone 1.52 tons. The quantity of charcoal required to produce 1 net ton of loupe was 159 bushels, with a consumption of 2.87 tons of lake ores, the charcoal being made of a mixture of fir and pine of medium quality. The ores carry 12 per cent. of hydroscopic moisture and 15 per cent. of silica, and from 0.31 to 0.76 per cent. phosphorus. The same ores in a charcoal furnace yielded 34.1 to 37.5 per cent. of iron. The force required is one smelter, with assistant, and one charger for each shift of 12 hours, with men occasionally needed to assist in charging, removing slag, &c. According to the official data the cost of making blooms by this process is nearly the same as that of making charcoal pig. With charcoal at 3.02 cents per bushel, ores at $2.40 per ton, puddle slag at 34 cents per ton, and daily wages at 35 cents, Mr. Garrison places the cost at about $16.25 per ton, an official report making it about $15.60 per ton. Until 1886 only these easily reduced ores had been used. It was then that a furnace was built at Count Stroganoff's iron works, at Dobriansky, in the Ural mountains, to use hard refractory ores, capable of making loupes to be hammered and rolled subsequently. Mr. Garrison gives analyses of the magnetite used and of the blooms made from the furnace, with an abstract from the official records concerning the product for 24 hours per furnace, the quantity of blooms made per bushel of charcoal fluctuating between 8 and 12½ pounds. On the basis of data submitted, Mr. Garrison puts forward the following estimate of cost, under the conditions existing in the Ural:

190 bushels of charcoal, at 4½ cents.	$8.55
2 tons of ore, at $2	4 00
1-10 ton of fluxes, at $1 12	0 11
Wages, at 40 cents	1.60
Total	$14.26

In conclusion Mr. Garrison mentions the latest and largest furnace built in the spring of 1887 at the Russian Government Works, at Petrozavodsk, on Lake Onega.

The last paper of the session was by Capt. O. C. Michaelis, describing "The Bofors Steel Gun," with which it appears very satisfactory results have been obtained by the Swedish Government. The gun is cast and is of special interest because of the now prevailing discussions of the relative efficiencies, cost and reliability of cast and built up guns. The session was adjourned shortly after 5 o'clock. In the evening a subscription dinner was given at the Hotel Brunswick.

Thursday, February 23.

For Thursday an excursion to Fitchburg had been arranged, a special train leaving the Fitchburg depot at Boston at 8.55 a. m. The principal object of interest was the works of the Simonds Rolling Machine Company, where the full plant of Mr. Simonds's machines, described in detail in *The Iron Age* of February 16, was in operation. The rolling of steel spheres, of various sizes, for ball bearings, and the rolling of screws, projectiles, carriage axles and other work, was practically illustrated. The works of the Putnam Machine Company and of the Fitchburg Steam Engine Company and the large saw works of the Simonds Mfg. Company were also visited. At these works the manufacture of saws was followed up in its different stages, interest being centered in the production of circular saws of all sizes up to 72-inch. Starting from the circular plate as obtained from the steel manufacturers, principally in the Pittsburgh district, the teeth are punched out by machinery. The saw is then delivered to the heating furnaces, which are provided with an oil bath directly in front of them. Into this the saws are plunged after having been heated, the larger sizes being handled by tackle. This process, even if carefully conducted, has the tendency to slightly warp the saw, which is carried to a number of furnaces adjoining the annealing furnaces, which are the special design of the Simonds Company. The circular saw is introduced between two heavy circular perforated plates, which are slowly forced against one another by hydraulic pressure, revolving at the same time and being heated simultaneously. From these furnaces the saws come out true and flat, and the usual hammering is entirely avoided. The next step in the process of manufacture is the grinding of the saw, special machinery being provided to grind the center of the saw to a smaller gauge than its circumference. After being trued, sharpened and set, the saw is polished. In another part of the works the manufacture of large band saws was also shown. The steel strip is first carefully hammered in those parts where it becomes necessary in order to produce a straight edge along one side of the saw. It is then ground, the teeth are cut, and the saw finally finished by brazing the two ends together. The works manufacture also cross-cut saws, and produce as a specialty a cross-cut saw having the so-called Cressond patent. By a specially designed grindstone the saw is so ground that the metal is removed on the arc of a circle. An additional specialty of the concern is the manufacture of planer knives.

While in Fitchburg the visitors were entertained at lunch by Mr. Simonds. Leaving Fitchburg at 1.20 p. m. the party arrived at Waltham at 2.30 p. m., and availed themselves of the invitation which had been extended to visit the celebrated Waltham Watch Works. A number of the visitors, however, went directly to Watertown to inspect the large testing machine at the United States Arsenal. Boston was again reached shortly after five o'clock. In the evening a session was held at the Institute of Technology, the opening paper being on

THE BOSTON HOT WATER SYSTEM,

which has already been repeatedly noticed. The paper was presented by Mr. A. V. Abbott, chief engineer of the company conducting the enterprise. The mains now in actual use extend over a length of about two miles and have supplied consumers for several months. The pipes, which carry a pressure of nearly 300 pounds per square inch, are tested up to 1500 pounds, and at this pressure have been found to show no leakage. What are known as vanishing screw threads are used for the joints, and expansion joints are introduced at intervals along the line. The expansion of the two miles of pipe when heated up to the working temperature amounted to about 60 feet. The pipes are clothed with asbestos, and are supported in two brick conduits, one within the other, with an air space between them. The pipe supports are iron arches on brick pillars, furnished with rollers so as to offer comparatively little resistance to expansion and contraction. Two lines of pipe are carried in the conduits, one the main supply line, and the other, and larger one, the return. The hot-water is circulated through the boilers and the main pipe line by Blake pumps, a steady flow being maintained and branch pipes being led off to consumers. These supply branches are about ¾ inch in diameter. After having given up its energy the comparatively cool water is discharged by return traps into the return main, which is connected with a separate set of pumps. The return main discharges into an open tank at the station, the water having a temperature of from 150° to 160° F. From this tank the water is again

forced into the boilers by separate feed pumps. The steam for working the different pumps is taken direct from the boilers. According to Mr. Abbott the loss of radiation in the main line of two miles is about 1½ per cent., and the loss in the return main about the same, making a total loss of 3 or perhaps 4 per cent. The coal consumption averages about 3½ pounds per horse-power. To avoid as far as possible disastrous pipe explosion the line is furnished at intervals with specially designed check valves. These are nothing more than ball valves resting in enlarged chambers in the pipe line, and of such diameter as to effectively close the ends of the pipe sections when forced against them. When the ball valves are at rest they lie in the chambers already mentioned, and offer no obstruction to the flow of water, providing the velocity of flow does not exceed a certain figure—about 10 feet per second. Should a rupture, however, occur in any one of the pipe sections the rate of flow will, of course, rapidly increase, and the rush of water carries the ball against one of the pipe ends, effectually preventing any further exit of water. Where a supply of steam is desired the water after entering the consumer's station, is expanded into steam in a heavy cast-iron chamber. Mr. Abbott claims that the bursting of a pipe could not be attended with any serious consequences, even without the check valves. This, however, is a claim which Boston consumers may yet find unpleasantly refuted.

After a brief discussion a paper on "The Phosphates of the Ottawa Valley, Canada," was read by Mr. Robert Bell. Three other papers, one by H. S. Munroe, on "The Theory of Jigging," and two by Mr. Jed. Hotchkiss on "A New Gas Coal," and "Coking Coal of the Flat Top Regions, Virginia," concluded the session.

Friday, February 24.

Friday was devoted to a series of excursions of small parties to different points of interest. One of these was a visit to the works of the Boston Heating Company whose operations were set forth, as previously mentioned, in a paper by Mr. A. V. Abbott. The works in their present unfinished state embrace eight Heine safety boilers of 100 horse-power each, working at a pressure of from 250 to 275 pounds. The circulating pumps, of which there are two sets, were built at the Blake Pump Works. The return mains, which run immediately beneath the supply mains, have been laid with the view of securing, as far as possible, a return flow by gravity —hence they, as well as the supply-pipes, are at some points at a comparatively great depth, in fact below tidewater line. This entails the great disadvantage that, at intervals, the conduits are completely filled with water, and the pipes submerged, causing, no doubt, a large loss of heat. The generating station is, at present, but one story high and many of the arrangements appear to be of only a temporary character. The daily consumption of coal at the present time ranges from 15 to 18 tons. A visit was also paid to the pump works of the Geo. F. Blake Mfg. Company. Other excursions during the morning had been arranged to Harvard University, the Chestnut Hill Reservoir pumping station, the Clapp-Griffiths Steel Works, at Wareham; the Lawrence Cotton Mills and the Tyler Tube Mills, of South Boston. This is one of the recent tube mills built in the country. A party was shown through the works by Mr. John J. Fisher, general superintendent, who has had a wide experience in this class of manufacture in England, Germany, Russia and in this country. The pipe strip, the bulk of which is imported, is taken to two scarfing machines, and then is introduced into a gas-heated bending furnace with a hearth 22 x 5 feet, the heated strip being bent after issuing from the furnace by a machine. The tube then goes to the welding furnace, which is heated also by gas and has a hearth 23 x 8 feet. Immediately in front of this welding furnace is the 24-inch welding train, through which the pipe is drawn immediately as it emerges from the furnace. After being reheated the pipe is once more put through the welding train, and is then given four or five passes in the 24-inch reversing finishing train. The pipe is straightened by hand and is finished in the usual way. All the heating throughout the works is done by gas, made in a series of producers from Westmoreland coal, the fuel consumption being stated to be 6 tons per day, double turn. The capacity of the works is 50 tons per day, the mill making all sizes of boiler tubes and pipe up to 7-inch. The managers have been very successful in producing steel pipes, and express their preference for them as a raw material over iron. Some of the samples exhibited by them show clearly what an amount of torture mild steel is able to bear without any suffering. The same party afterward visited the Downer Oil Company, at South Boston, where the Merril hot-air engine was inspected. There are at the works one 5 horse-power and one 20 horse-power engine, which was highly thought of by the visiting engineers, and to which we shall refer at a future time.

For the afternoon visits had been planned to the Norway and the South Boston Iron Works, the Ames Shovel Works, at North Easton; the Boston sewage pumping engine, to which we referred at some length in our account two years ago of the Boston meeting of the American Society of Mechanical Engineers, and to the works of the Thompson-Houston Electric Company, at Lynn. Probably the largest number visited this last establishment, the promised exhibition of electric welding and power transmission, and the various operations of arc and incandescent lamp manufacture and testing, dynamo construction, &c., having attracted attention. The works are of considerable extent, and guides were kindly furnished to conduct the visitors through the different departments and explain the points of interest. Several electric welding machines were in operation uniting round rods of iron and steel of different diameters, the largest rod thus far successfully worked having a diameter of about 1¾ inches. The welds are butt welds. The rods to be united are securely clamped in two arms, and their points being brought together a powerful induced current is passed through them. Owing to the resistance of imperfect contact, the points in a few seconds are at a welding heat, and by a screw attachment are firmly pressed together, a perfect weld being secured. Borax powder is used on the surfaces. Two rods which had been welded together in this way were turned down and polished to show how perfectly they had been united. The line of weld was scarcely to be observed. The heat in several instances was so great that drops of molten metal were produced. No attempts, we understand, have yet been made to weld sheets or to carry out work where there are appreciable surfaces of contact. In the line of electric power transmission the visitors were shown a 5 horse-power Thompson-Houston motor attached to a centrifugal pump, raising water. A larger motor, rated at 15 horse-power, furnished power for the carpenter shop in the works, running saws, drills, &c. The generating dynamos, all of the Thompson-Houston type, receive power from the two main engines of the establishment. These are Greene automatic engines, each of 250 horse-power. Opportunity was also given to examine the winding of armatures, the finishing and testing of the different forms of electric lamps and the details of construction of the dynamos for arc and incandescent lighting and power. The whole exhibition was of great interest and was correspondingly appreciated. Invitations had also been extended to visit the laboratories of the Massachusetts Instisute of Technology, the Museum of Fine Arts and the museum and library of the Boston Society of Natural History. Of these a number of members availed themselves.

The Closing Session

was held at eight o'clock in the evening. The report of the council showed that the receipts from all sources for the year ended January 31, 1888, including the balance at the beginning of the year, amounted to $23,282, and expenses to $18,667, including the amount expended in the purchase of United States bonds, leaving a surplus of $4615. The actual receipts of the year were $2829 greater than the expenses, this increase being partly due to the larger number of members and partly to the larger sale of publications. During the year 200 members and 29 associates have been elected, 7 members have been reinstated, 23 members and 12 associates have resigned, 56 members and 11 associates have been dropped from the roll, and the deaths of 11 members and 1 associate have been reported.

The following officers were elected for the ensuing year: President, Prof. W. B. Potter, Washington University, St. Louis, Mo.; vice-presidents, J. C. Bayles, New York City; Alfred E. Hunt, Pittsburgh, Pa.; Prof. T. Sterry Hunt, Montreal, Canada; managers, Robert Forsythe, superintendent of the Union Steel Works, Chicago; Kenneth Robertson, manager of the Floss Iron Company, Birmingham, Ala.; Chas. M. Rolker, New York City; treasurer, Theo. D. Rand, Philadelphia; secretary, R. W. Raymond, New York City.

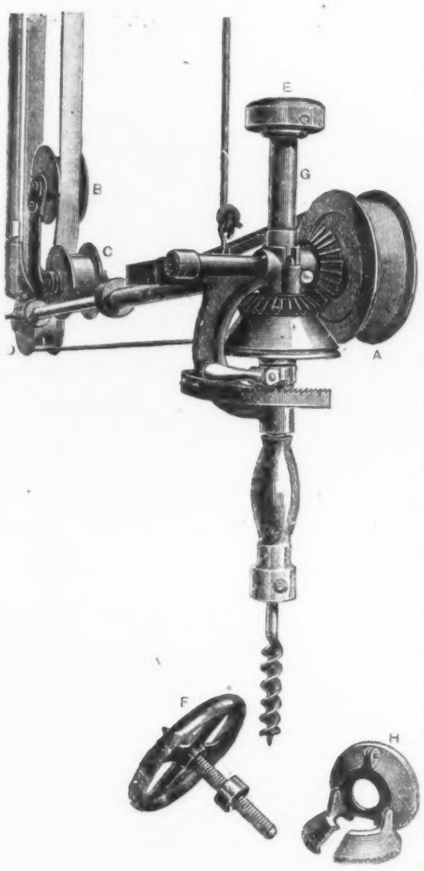
A number of papers yet on the list were then presented or read by title. They included the following: "The La Plata del Libano Mines, Colombia," by Willard I. Pierce; "Western Kentucky Coals and Cokes," by Joseph H. Allen; "An Improved System of Water Supply for Hydraulic Mining," by H. D. Pearsall; "The Bedded Ore Deposits of Red Mountain, Col.," by G. E. Kedzie; "The Russell Process in its Practical Application and Economical Results," by Ellsworth Daggett; "Steel Rails," by F. A. Delano; "The Thermal Properties of Slag," by H. M. Howe; "Trough Lixiviation," by Ottokar Hofman; "Note on a New Device for Operating Blast Furnace Charging Bells," by F. C. Roberts; "The Determination of Silica in Cinder," by R. H. See; "A Method for the Estimation of Manganese in Steel," by Frank Julian; "A Glossary of Furnace Terms in English, French and German," by Thomas Egleston; "Prominent Sources of Iron Ore Supply," by John Birkinbine; and a "Note on an Asphaltic Mineral from Utah," by Thomas A. Drown.

The whole meeting was an unqualified success. The attendance, as already indicated, was good, the social and business features were well balanced, and the programme prepared by the local committee was excellent and well carried out.

Joseph G. Butler, Jr., of Youngstown, Ohio, having disposed of his interests in the Bessemer Consolidated Iron Company, controlling a number of Gogebic iron ore mines, resigned the presidency of that company on the 1st ult., and was succeeded by ex-Senator Dorsey. Mr. Butler's interests in Menominee range mines and his active management of the furnace business of the Brier Hill Iron and Coal Company absorb so much of his time that he found it impossible to give proper attention to the affairs of the Gogebic ore syndicate.

Universal Power Boring and Drilling Machine.

Mr. M. C. Henley, of Richmond, Ind., is putting on the market a universal power boring and drilling machine, which we illustrate on this page. The machine is designed for boring in woodwork or light drilling in iron, and its arrangement is clearly shown. The belt-wheel A is driven by a belt from the counter-shaft and about three idler pulleys, B C D, the pulley B serving to keep the tension on the belt always the same, no matter in what direction the apparatus is moved. The cap E, which is removable, may be taken off and the feed-screw and nut F put in its place,



Power Boring and Drilling Machine, Made by M. C. Henley, Richmond, Va.

for which an enlargement at the top of the tool frame G is provided. This enables the operator to use the machine for light drilling in iron, the change being made in a very short time.

The frame G is bored out sufficiently to permit of the feed screw moving up and down freely. The shield H is designed to be made fast to the frame G and to cover the gears, providing an absolute safeguard against accident to clothing or fingers. The gears referred to are all cut and run with little noise. The form of the chuck used is what is known as the "Oneida," taking in drills or bits measuring from 0 to ⅝ of an inch in diameter. The machine is operated by means of two bevel gears, one of which is attached to the tool shaft extending downward in the shape of a cone. Beneath this and attached to the tool shaft is a cone paper-wheel which fits inside of the cone attached to the cog-wheel. This paper-wheel, when the machine is not in operation, drops down and does not come in contact with the cone attached to cog-wheel until the small ratchet lever is drawn around toward the right, which action forces the paper cone into the iron cone, immediately starting the tool shaft. These two wheels are at all times separated by means of a coil spring located above the tool shaft, and in the tool frame G, except when driving screws, boring or drilling. For this work it is only necessary to press on the cap E, the ratchet lever remaining in one position. The instant this pressure is removed or the lever thrown back the wheels separate and the tool shaft ceases to revolve.

The apparatus is perfectly balanced, is as easily handled as a common brace, and can be used for the most accurate work, running from 500 to 1000 revolutions per minute, according to the work and size of bit used. It can be moved or operated at any angle or direction desired, and is well adapted for a large variety of manufacturing establishments. The machines are at present made in two sizes, Nos. 1 and 2, the former having a capacity for boring a ¾-inch hole in hard wood, and the latter a 1¼ inch hole.

Condition of Western Nail Mills.

A decided improvement in the Western cut-nail trade has recently taken place, and while this improvement so far is only confined to demand, it is confidently believed that the bottom has been reached in prices, and an improvement in this direction is looked for before a great while by manufacturers. With the purpose of ascertaining as nearly as possible the views of some of the leading manufacturers of the West on the present condition of the nail market and its future prospects, we recently addressed letters of inquiry to them requesting information as to the condition of their mills, present prices and stocks on hand. It will be noticed by a perusal of the answers which we have received, and which we herewith publish, that a number of the mills, particularly at Wheeling, are running to their full capacity and that stocks are extremely light. At Pittsburgh the improvement is not so marked, but as that city is no longer recognized as a "nail city," it having surrendered that title to Wheeling some years ago, this is not to be wondered at. In the first-named city, out of a total of six firms who manufactured nails up to two years ago, there are but two who are at present doing anything in this line. These are: Jones & Laughlins, Limited, and Chess, Cook & Co., who are running about half of their machines. Shoenberger & Co. have made but few nails in the last year, while Graff, Bennett & Co., Zug & Co. and Moorhead, Brother & Co., have not made any nails for more than two years past. As probably one-half of the nails now being manufactured west of the mountains are being made at Wheeling and its immediate vicinity, the reports which we have received from the manufacturers at that place will be of special interest. They are as follows:

Riverside Iron Works, Wheeling, W. Va. (224 machines): "Our nail factory started up on February 9, and present prospects are favorable for a continuous run in that department for some time to come. All of our machines are in operation. The demand for nails is fairly active, and stock on hand is light."

La Belle Iron Works, Wheeling, W. Va. (143 machines): "Our nail department has been in almost full operation for the past 18 months; the only stoppages were those incidental to all manufacturing industries. At present all our machines are in operation. Our stock is completely broken, and we are shipping as rapidly as the nails are made. The demand is excellent, and, while prices are not good, yet we have orders for all we can ship in six weeks or two months. We confidently look for better prices and good demand."

Belmont Nail Company, Wheeling, W. Va. (152 machines): "Our nail factory is running with but about 110 of our 152 machines in operation. We cannot run our small machines at nail-factory scale for cutting and compete in the market with the smaller nails made on the tack-factory scale and the smaller wire nails. There is a good demand for nails, and the stocks hereabouts are very light, as the product is shipped as fast as made."

Laughlin Nail Company, Wheeling, W. Va., Works at Martin's Ferry, Ohio, (192 machines): "We are running our nail factory full time, making something over 10,000 kegs steel nails per week. The prospects for a continued run are very favorable, though prices are unusually low. We have next to the largest nail factory in the world."

Spaulding Iron Company, Brilliant, Ohio (78 machines): "Our nail factory is idle now on account of some demands of our workmen which it is impossible for us to grant."

Falcon Iron and Nail Company, Niles, Ohio (44 machines): "We are at present running our nail factory full time and will probably do so for the next three or four weeks. Further than this it is impossible for us to say, as everything will depend upon demand and prices. Our stock is not large, and the present demand light compared to what it was several years ago."

Brown, Bonnell & Co., Youngstown, Ohio (49 machines): "Our nail factory was idle for three or four weeks, but resumed operations on Monday, the 20th ult., with 20 machines working out of a total of 49. We have very few nails in stock at present, and the demand up to the present time is not very heavy."

Norton Iron Works, Ashland, Ky. (126 machines): "Our nail factory is in operation with about three-fourths of our machines running pretty steadily, furnishing all the nails that we can find a market for. The price is so low that we are only striving to keep our workmen together, and we do not look to the future for nuggets of any kind, but will be thankful if it does not get very much worse."

Etna Iron Works, Limited, Newcastle, Pa. (55 machines): "We are not running at present on account of the unsatisfactory condition of the nail market. We have not decided to shut down for any given length of time. We are ready to start at any time that nails can be made at a profit."

Jones & Laughlins, Limited, Pittsburgh, Pa. (63 machines): "The nail department of our works is at present in full operation, practically all of our machines running at present. The demand is fair, at extremely low prices."

Chess, Cook & Co., Pittsburgh, Pa. (96 machines): "We are running our nail machines only about half time. There is a fair demand, but we do not care to sell at present rates. Our stock is very low, and we propose to keep it low, until we have some prospect for better prices."

From the above correspondence it will be noticed that the manufacturers express themselves as being hopeful for an improvement in prices, and we see no reason why their hopes should not be realized, in view of the very light stocks reported on hand, and the brisk demand being experienced at present for nails.

Bellaire Nail Works, Bellaire, Ohio, 125 machines.—"Our nail factory has been in operation since the early part of February. Only a portion of our 'cold machines' are in operation, as the requirements of the trade do not absorb the entire product of smaller sized nails. We have 125 nail machines in our factory and about 100 of them are in operation."

Junction Iron Company, Mingo Junction, Ohio.—H. M. Priest, president, writes: The writer is somewhat loth to appear in

print, but replies to your several inquiries will provide opportunity for expression upon the Western nail interests, which, through this medium, will likely reach many who have large investments in such properties, but pay but little attention to their management. The writer has no desire to shirk criticism for his part in the conduct of the nail business, but does claim there are conditions existing and methods employed which are unbusinesslike for which he is in nowise responsible and which no one manufacturer can correct. In regard, then, to the nail department of our works, we beg to advise: It is now in full operation. The strike of heaters, rollers and nailers, which commenced on July 1, 1887, terminated about the 1st of this month by the men accepting terms proposed to them by the company before the strike began. We have been able to dispose of our product since starting at prices found prevailing when we resumed. The demand at present is good, as it always is when "rock bottom" is reached in price. The general situation is not different from what it usually is at this season of the year. I have no knowledge of present stocks of nails at factories, but understand that dealers are now fairly well supplied, either with nails actually in stock or by unspecified orders in hands of manufacturers with prices guaranteed against a decline.

Now as to the future of the industry. The nail business has so many ridiculous features to contend with which have grown up through a long series of years that it is very difficult to say whether the industry has a future or not. If manufacturers can lay aside the jealousy of trade and sharp practices by which they seek to gain temporary advantages, and come together firmly united on some liberal platform, with honest intentions and with honorable and noble purpose in view, there is no question but the nail industry could again be put on a profitable basis and operated in a legitimate manner. In order, however, to illustrate the necessity for changing existing methods, the writer may be pardoned for presenting some of them. The cut-nail manufacturers of the West are supposed to have an organization, entitled the "Western Nail Association of the U. S. A." Now, that is simply a something with a president and secretary, but without a preamble, constitution or by-law, no defined object or purpose, and does not command the respect of even its own members. It cannot compel their attendance or punish them for absence. It can formulate a policy, but cannot execute it. It can receive pledges of faith, but can neither maintain them nor compel their observance. In its palmy days its membership represented, in nail manufacture alone, an annual business of more than $10,000,000, and to take care of this vast interest you could only get the attention of a portion of the members at monthly meetings, and when they came the average session would last from two to five hours. This was the ruling condition, to which, of course, there were occasional exceptions. Consequently it was impossible in this manner to intelligently control and operate such large interest to its greatest advantage. Hence it has drifted into a condition of imbecility, we might say, and manufacturers in all seasons, but particularly in winter, insist on producing more nails than can be consumed, and also insist on placing them in the market. This action, of course, tends to lower prices until nails are sold at and below cost. Then come the heavy buyers in anticipation of spring business, who buy up and stock all the nails they may want until midsummer. About the time they are all fully supplied the manufacturer realizes that his conduct has been somewhat questionable, as he has taken the orders at a price guaranteed against a further decline, and in order to gain some protection he becomes an enthusiast for advancing prices. A few members of the association come together and pass a resolution to put up the price, which holds good about long enough to let the merchants sell out their purchases at a good margin, then the price starts down again. The dealer can buy and hold the nails; the manufacturer seems unable to do so. At least, he is unwilling to either hold the nails or keep his factory idle if it is possible to work off the nails at any price. No individual manufacturer ever cuts a price; collectively they all do, as their stockholders in this district have frequently found out at dividend time. The "broker" element is another feature responsible for a great deal of irregularity in the nail business. The manufacturer who does not employ two or three brokers cannot hope to run his price down near so fast as those who do have them employed. The average broker can sell for two or three or more mills as easily as for one, and manufacturers who would not think of telling each other their prices have no hesitation about placing their goods in the hands of same broker. He glides over the country about this time of the year in a palace car, and in the morning ariseth from his berth and betaketh himself to the rear platform, and from his solitude abruptly inquires, "What are the spring breezes saying this morning?" The spring breeze answers, "The Eureka Mill (unheard of before) is beating your price on nails 5 cents." At the first telegraph station at which his palace car stops he pulls up at the wire, for he is industrious and energetic, and wires his principals, "The Eureka Mill beats my price 5 cents. Can I see him?" and on receipt, his principals, after very grave reflection for about two seconds, reply: "Certainly, but be careful to make all quotations strictly confidential." The writer never could understand what "see him" means, but after this ambiguous correspondence the price invariably falls 5 cents. You can always rely upon this fact, when there is any stability in the price of nails there are no brokers on the road. Salesmen traveling direct from the factory are quite similarly affected. Buyers often flatter the salesman by placing an order they never expect to specify for, just because it happens to be that particular salesman. Of course he accepts the order with the usual guarantee against decline, so that the manufacturer never knows what he is going to get for his nails, no matter what his raw material costs. Orders apparently never are contracts. It is asserted that members of the association have deliberately walked from meetings at which they had voted to advance price to the nearest telegraph office and advised large customers that an advance had taken place, but that they had "booked" their orders for round lots at old price. Another statement is made that members have sat in meetings asserting they had been faithful in maintaining a stated price, and other members at same meeting had correspondence in their pockets direct from the faithful member's house which convicted him of infidelity. Now, with such practices prevailing, and which will not be questioned, how can any benefit arise from such an organization? If the same energy and skill were displayed in trying to secure a remedy for existing conditions as is displayed in attemping to cover up the cutting of prices there could no doubt be some formula presented which would still make the cut-nail interest profitable. The object of the writer in so detailing the methods of the nailmen is, if possible, to have them see how ridiculous their business methods must appear to business men, hoping that, grasping the situation in its present disagreeable, unsatisfactory and unprofitable condition, they may become willing to honorably and sincerely strive to improve it. Of course we have the wire nail and tack factories to contend with, but we need not complain so much of them if we give those intrusted to us proper care and attention.

The Coke Industry of Alabama.

The Birmingham *Age* prints a review of the coke industry of Alabama, justly recognizing that one of the most important questions for the Birmingham district just now is whether the increased production of fuels in the near future will keep pace with the additions to the iron-making plant or not. There are 14 furnaces going up in Alabama; fuels are scarce and high with the present demand; obviously somebody must suffer if the product is not largely increased in season for these heavy consumers? Will it be increased sufficiently?

First as to the coal development: The Tennessee Coal, Iron and Railroad Company, who are now raising not far from 3000 tons of coal a day from the Pratt mines, will be able to dig 500 more by the time it is demanded by the first two of their four furnaces, and by the end of the year, which will be in time for the others, another 500. The new openings of the Sloss Iron and Steel Company, near Coalburg, will yield some 300 tons of coal every day in a short while. The DeBardeleben Coal and Iron Company, after several disappointments, have a slope satisfactorily opened to a depth of 1200 feet. This will feed the company's first furnace, which probably will go in blast about the 1st of April. Then the Bessemer and Sheffield Coal and Iron Company have four openings under way, which, together with the DeBardeleben mine, will supply in the next few months, for the DeBardeleben coke ovens and for the trade at large, some 1200 tons of coal a day. It is scarcely necessary here to take into account the work that the DeBardeleben Company have laid out in the untouched field of Murphree's Valley, where, as the company's chief engineer reports, the physical conditions are favorable for very large operations.

The Alabama-Connellsville Coal and Coke Company before fall will be taking some 300 tons of coal a day from their wonderful 22-foot vein. This for the Birmingham district proper. In the West Warrior field the people are not idle. Walker County may be counted on for an increase of not far from 500 tons of coal a day in the next six months, a good part of which will go to feed some of the Sheffield furnaces. Then as much more may possibly be expected of the Cahaba field. Coke making has but fairly begun in Alabama. To the 450 coke ovens at Pratt mines—250 of them new—the 350 now under way will be added in the next six months. The DeBardeleben Company have 150 ovens about completed at Bessemer, and will build as many more. At Coalburg work is well advanced on 80 Thomas ovens, the equal of some 250 of the beehive oven now in use hereabouts. The Cahaba Coal and Mining Company have begun work on 400 ovens at Blockton. The Eureka company will shortly duplicate the 100 ovens bought of the Tennessee Coal, Iron and Railroad Company at Helena. The Alabama and Tennessee Coal and Iron Company have broken ground for 300 ovens at Jasper, and it is not to be presumed that the work will be allowed to lag, seeing that coke was brought from West Virginia at a cost of nearly $5 a ton to fire the first Sheffield furnace and save its concessions from the original land company. There are six ovens of a new patent going up at Jasper, too, on capital contributed by several of the Walker County coal concerns, and if they are a success others will follow at the mines.

It may now be shown in detail where most of the Alabama coke furnaces will get their fuel. The Tennessee Coal, Iron and Railroad Company will take care of themselves, of course, as well as of their present contract customers, the Sloss and Mary Pratt furnaces. The DeBardeleben and Eureka companies will make their own fuel also. The Sloss ovens, at Coalburg, will supply the same company's two stacks at North Birmingham, along with the Williamson furnace. The Pioneer Mining and Mfg. Company, it is expected, will make their fuel after a little while somewhere on their extensive coal property. Their first year's fuel is secured by contract with the Cahaba Coal and Mining Company, who will also supply the Anniston furnaces, this arrangement being part of the consideration of the recent purchase of a large block of their stock by the Woodstock Coal and Iron Company. Terms have been made with the Tennessee Coal, Iron and Railroad Company for coke for the Cole plant at Sheffield and the new Gadsden Furnace. A safe estimate puts the added coal product at 6500 tons a day, and the coke product at 2000 tons.

Another Great Strike.

Scarcely is the Reading Railroad and coal miner's difficulty settled before another strike, which may prove even more formidable, is proclaimed on the great system of railroads known as the Chicago, Burlington and Quincy, involving over 1000 miles of main track, besides branches which aggregate at least 2500 miles. In "Poor's Manual" the mileage is given as follows:

	Miles.
In the State of Illinois	1,156
In the State of Iowa	784
In the State of Missouri	108
In the State of Nebraska	1,238
In the State of Kansas	185
In the State of Colorado	175
Total	3,646

On Monday morning, in accordance with previous arrangement and with the consent of Chief Arthur, of the Brotherhood of Locomotive Engineers, 2000 men left their engines at precisely 4 o'clock, and trains were forthwith abandoned, wherever they happened to be. Respecting the causes of the strike, Chief Arthur said the publication by General Manager Stone of all the propositions offered by the men might mislead the public. "We were willing to discuss these propositions one by one, and in case we failed to convince Mr. Stone that they were just and fair, we would have made concessions. The strike did not occur because the schedule we offered was not adopted, but because when the question of wages was reached Mr. Stone refused to do anything at all. The fight is purely a question of wages. We receded from our first proposition and offered to accept 3½ cents, which Mr. Stone refused in the most positive manner. He made no proposition to us at all, and the fight now is purely on the question of pay." In other words, the brotherhood demands that all the engineers be paid the same wages for the same mileage run on trains of the same general class.

Solicitor Goddard, of the railroad company, gives their side of the case as follows: "The two main points of the controversy between the engineers and the railroad company are the question of the rate of pay and the classification as to the method of the rates of pay. The C., B. and Q. system is now divided into divisions over which the several runs are made. There are branch lines and runs different from this main line. The pay of the engineer is based on the amount of work done on these divisions, and the value of his services and the amount of business done. The pay is so much for the trip, not so much per mile. This is the most equitable way of paying, because these division runs differ at different sections of the road, according to the difference in the amount of labor, time and responsibility required. This trip basis, in view of all the varying conditions, covers the value received. The engineers demand that the pay should be put upon a mileage basis—3½ cents for passenger and 4 cents for freight; firemen 60 per cent. of these figures, it being immaterial whether the engineers or firemen are running upon the main line or running upon a branch." Negotiations having failed, a strike is inaugurated, which the engineers regard as the last desperate resort, justified only in extreme cases; and it is the rightful boast of the brotherhood that during the experience of 10 years they have found adequate relief through peaceful arbitration. It is lamentable that they now feel themselves compelled to break a record so honorable. A prolonged struggle is now in prospect, entailing heavy losses of property and much individual suffering. The respective champions represent probably the most powerful and influential labor organization in the world and perhaps the largest and most opulent railroad corporation in the country, hitherto enjoying an enviable repution for shrewd and judicious management. Should the contest prove stubborn, other systems of road are liable to become involved, paralyzing the channels of trade so far as its influence extends. Already we hear of the Rock Island Road taking a hand in aid of the brotherhood because freight from the boycotted Quincy and Burlington was being transported over their line. The policy of the Knights of Labor is declared by the leaders to be non-interference, but there is a tendency on the part of discharged engineers from the Reading to seize upon vacant positions on the Chicago, Burlington and Quincy, which is naturally ascribed to vindictiveness—the latter referring with a sort of grim irony to their struggle with Gould's Southwestern system where they were left to ignominious defeat.

A New Electric Furnace.—In order to conduct experiments on different materials at high temperatures, while at the same time subjecting them to great gaseous pressures, M. L. Cailletet, of Paris, France, makes use of a hollow cylinder of steel, having a capacity of about 15 cubic inches. This cylinder is hermetically closed at both ends, but in one case the obturator is a screwed plug removable at will, through which pass two copper wires, one of which makes metallic contact with the plug, while the other is insulated from it. Inside the cylinder the ends of these wires are connected by either a piece of platinum foil, shaped like a crucible, or else a helix of platinum wire, forming a sort of muffle, inside of which the articles to be experimented on are placed. By passing the current from a set of accumulators through the platinum it can be raised to a white heat, which is quickly communicated to the material resting on it, so that, for example, a fragment of gold can be melted in a few seconds. In order to introduce the compressed air or other gases the wall of the cylinder is pierced with a capillary hole, which is connected by a copper pipe with a reservoir containing the compressed gases. Another orifice closed with thick glass is also pierced, to permit the interior to be inspected during the progress of the experiment. If a higher temperature is required than can be obtained by the above plan, M. Cailletet replaces the platinum foil or spiral by two carbon rods, one of which is hollowed out, forming a kind of crucible, and an arc is then established between them in the ordinary way.

Shafting and Pulleys.

The general progress, says the London *Engineer* of recent date, which mechanical engineering has made during the last quarter of a century has affected not only the more imposing class of works, such as bridges, steamships, &c., but also almost every detail of the workshop and factory. Take, for instance, the item of shafting and accessories. Within the period mentioned shafting, instead of being made of wrought iron, has come to be made of steel in all the newer and higher class factories. The bearings, instead of being rigid, are now usually of the type known as swivel bearings. These not only accommodate themselves to any irregularity in the movement of the shaft, but they are longer than they used to be made, and therefore are more enduring, and they are furnished at the ends with cups to avoid the annoyance of the continual dropping of dirty oil. If lubricated with needle lubricators they require no attention, except at long intervals, and there is no liability to run dry. Pulleys instead of being solid are now always in halves, so that they can be slacked and shifted or removed altogether in a very short space of time. The mere screwing together of the two halves is sufficient to fix a pulley to the shaft without the necessity for keys, as was formerly the case, and which so often threw them out of true. As regards very large pulleys, the construction of these of wrought iron or steel by building them up, as it were, has become a large and important business, and fortunes have even been made out of the manufacture of them. The first person who advocated and made large wrought-iron pulleys was the late Mr. Joseph Rodgers, of Leeds, and large quantities of them are still made by his late partners.

Mr. R. N. Oakman, Jr., of the John Russell Cutlery Company, Turner's Falls, Mass., writing to Mr. E. C. Simmons, of St. Louis, makes the following statement concerning his experience with the Loomis water-gas process: "I believe that we are first to be successful in the use of water gas for heating forges. We do it at a saving of 25 per cent. to 35 per cent. in cost of fuel over coal, this varying with the class of work. The saving is not so large here as it would be in the West, for this reason: In burning coal, anthracite is necessary for such forges, which costs here ordinarily $6.50 per ton, and probably more with you. We burn in our gas generators bituminous, which costs $4.75 here, and with you probably slack is worth less than $1 per ton. You can see the difference without my explaining more. I would say that with coal at $4.75 per ton we have made gas at a cost between 12 and 13 cents per 1000 c. f. delivered in holder, and our holder pressure is 16 inches. Our gas is of the very best quality of water gas, better when from bituminous coal than anthracite, and we send gas into the holder, not steam. We have no condensation. We get from 40,000 to 45,000 c. f. gas per ton of coal, and with the cost of your slack in St. Louis you can figure readily the cost of gas in the holder. We have not been working here at the best advantage as yet, as we have been wasting the generator gases, which in two or three weeks we shall burn under our boilers, and I expect to reduce the cost of the gas in the holder to 10 cents."

The recent bursting of a 10-inch gun while under proof at Woolwich, England, again directs attention to the fact that there is not that generally supposed immunity from disasters of this kind abroad. The gun, though probably tested at the works where it was built, was utterly destroyed—a fact which it will be hard to gloss over.

THE WEEK.

The sugar trust, between inquisitive legislators and internal dissensions, finds that it has not a very "sweet thing," despite the $45,000,000 of certificates issued. Rumors of trouble both in Philadelphia and Boston thicken every day. Besides, Claus Spreckles is said to have made definite plans for a great rival refinery in New York, to which he will ship raw sugars, heretofore delivered in San Francisco, and he proposes to associate with him all disaffected refiners not in the combination already formed. Claus Spreckles alone, is said to have $15,000,000 to put in the fight. The first intimation of trouble was the offer in Boston, by parties in Philadelphia, at $\frac{1}{32}$ to $\frac{1}{8}$ cents below trust prices.

William W. Corcoran, the millionaire philanthropist and banker of Washington City, died at his residence in the capital, 24th ult., aged 89 years. Although he is said to have given away two-thirds of his wealth the remainder of the estate is estimated at $3,000,000. The most noteworthy of his gifts is the Corcoran Art Gallery and the "Home for ladies who have seen better days." The loans of the Government from 1846 to 1848, amounting to nearly $40,000,000, were handled by Corcoran & Riggs, who at one step went to the front and were the clients and friends of the Rothschilds and Hopes and Barings.

The Cotton-seed Oil Trust was the subject of examination by the Senate Investigating Committee, and the result was several interesting disclosures. John Scott, who is prominent in the organization, testified that the trust included nearly all the oil companies in the Southern States. The total amount of cotton-seed oil produced last season was about 700,000 tons, and of this amount 530,000 tons was produced by the cotton-seed oil trust companies. About 20.5 per cent. of the total amount of seed ground was exported. The seed is purchased from farmers, taken to the mill and ground, and thence to the refineries, where it is transformed into white oil, which is used in mines for various purposes and as a lubricant in machine shops. A ton of cotton-seed produces from 35 to 45 gallons of cotton-seed oil of different grades. Since the formation of the trust, in 1884, the combined companies have realized $2,400,000 in profits, which was dispensed in quarterly dividends of 1 per cent. on the par value of the certificates. Through the operation of the trust the price of the raw material has been advanced, while that of the refined product has been lessened, although no improved machinery has been introduced. The trust was formed primarily to avert bankruptcy. The par value of the 417,000 certificates issued is $41,700,000, and these were at present being dealt in in the open market.

The Pennsylvania Railroad ferry-boat New York is being fitted out with B. F. Sturtevant's steam hot-blast heating apparatus.

The Boston Towboat Company have bought a large tract of land at East Boston, where they are to erect repair shops, a marine railway, and establish a coaling station for their great fleet of tugs.

Ario Pardee, one of the largest coal operators in the Lehigh region, testified before the Congressional Committee of inquiry into the coal miners' strike respecting the cost of a ton of coal. Witness never owned any lands, but leased about 3000 acres of coal lands, most of it from the Lehigh Valley Railroad Company. He pays the Lehigh Valley Railroad Company 45 cents a ton royalty for mining coal on their lands. Witness said he employs over 1000 hands. When asked what the cost of mining a ton of coal was the witness at first refused to answer and flatly told the committee that it was none of its business, but finally said that, exclusive of royalty and not considering the interest on capital invested, it cost to mine and put a ton of coal on the cars $1.50, the labor costing $1 a ton. He could not give the committee the items of expense which made a ton of coal cost $1.50.

Plans are said to be maturing by the New York and Boston Rapid Transit Company, of which D. C. Linsley is chief engineer, for the early commencement of the work of construction from Fifty-ninth street to Harlem River, including the bridge. Engineer Linsley sailed for Europe on the 18th ult. to consult with engineers who are constructing viaduct roads in London, Berlin and Vienna, and expects to return in March with all needed information. The completed line will be 200 miles in length, and the entire distance will be traversed in 3½ hours. J. Gregory Smith, president of the Vermont Central, is the acting president.

The Boston Chamber of Commerce, as reorganized, had its first banquet on the 22d ult., 225 guests participating. President Alden Spear occupied the chair, and in his address spoke of the demands of Boston for equality in transportation, as compared with other cities. Boston, he said, asks no special favors. "When, however, the Interstate Commerce Commission say in effect that it is right for the Lake Shore and Michigan Southern Railroad to charge $10.48 more for transporting 30,000 pounds of flour from Chicago to Buffalo, when the flour is coming to Boston, than they do on the same quantity brought in the same train and between the same points, when destined for New York—if this is justice and equity, Boston wants no more of that kind."

The law cases long pending involving the title to the lake shore front at Chicago have been finally settled by Justice Harlan, of the United States Circuit Court, who decides in favor of the Illinois Central Railroad Company.

The Interstate Commission decides in the case of several shippers of oil by Southern railroads that no discrimination can be allowed in favor of shippers by tank cars, that the charges should be the same per 100 pounds, whether the oil is in tanks or barrels.

The Third Avenue Railroad Company desire permission from the city to construct a cable conduit on their line, and thereby dispense with horse power, but the corporation counsel decides that this right is not conferred by the company's charter, which says "no steam power shall be used on any part of the road for propelling cars." Assistant Corporation Counsel David J. Dean said that the company should apply for a new franchise, and pay a portion of their receipts into the city treasury, as would become necessary under the Cantor act of 1884. The terms of the present franchise are so broad that they absolutely prohibit the proposed stationary engines.

The coal miners' strike in Pennsylvania is now among the events of the past, but will long be memorable. The radical element among the Reading Company's miners who at first refused to heed the orders of Master Workman Lewis finally yielded to the pressure of circumstances and on Thursday resumed work. The company at the same time reduced the price of miners' supplies and arranged to distribute Mr. Corbin's donation of $20,000 to all those whose names were on the pay roll in January, when the strike originated. Another important movement was the partial return to work of the miners in the Lehigh Valley on the same terms as the Reading Company's men. The latter went out as long ago as September 10. The trouble, however, is not ended wholly. The Reading Railroad strikers by formal vote on Friday resolved to continue the struggle, Chairman Lee of the Executive Committee expressing confidence that they would win. The railroad men think they see their opportunity in the necessity for obtaining experienced hands in order to market their coal.

The Governor-General of Canada at the opening of Parliament at Ottawa, 23d ult., referred to the fisheries treaty just negotiated at Washington as "honorable and satisfactory to both countries."

Collector Magone of this port has obtained through the Spanish Consul conclusive evidence that opium smuggling has been practiced in this city on a large scale for several years. It appears from the results of investigation that the quantity of opium withdrawn from the bonded warehouses here for export to Havana for a period of three years has been 150,000 pounds, while the actual amount received at Havana was 20,000, a difference of 130,000 pounds, of which there is no record here. These figures include the total opium exportation from this city, the business of 20 firms. Altogether, fraudulent exportations have been traced to the extent of $1,300,000. Precisely what becomes of the opium subsequent to its withdrawal from the bonded warehouse does not yet appear, nor the source from which it is derived. The common impression is that the drug comes through Canada, and is either disposed of in this city or reaches its foreign destination without entry on the ships' manifest. In one instance 1300 pounds were found on a steamer of Ward's line, where it had been secreted. As the charges brought by Chief Holohan, special agent of the Treasury Department, are very definite, the arrest of a number of importers and others concerned is expected to follow. It is said that the captains and officers of the Ward line steamships will be put under arrest at Havana and the steamships will be libeled for the penalty for smuggling the quantities of opium mentioned. Then Ward & Co. will settle with the Cuban customs authorities and bring suits against the firms that are suspected.

Naval Constructor Fernald has made a report to the Navy Department in regard to the condition of work on the cruiser Charleston, building at San Francisco. The total estimated value of the material used in the construction of the hull to date is $98,780, and the total amount of labor on the same to date is estimated at $119,060. The value of the material on hand is $76,467. The total amount earned, labor and material, to date, is $284,307. The amount already paid to contractors on account of hull is $227,800, and the amount now estimated as due to contractors is $66,507. Constructor Fernald says that the quality of the workmanship and material is good, and he thinks that the contractors have fully earned the amount above stated.

The wonderful resources of the great Northwest are spoken of in a report from the Committee on Territories relating to the admission of North Dakota as a State of the American Union. It is shown that the proposed State of North Dakota will be exceeded in size only by Nebraska, Kansas, Minnesota, Oregon, California, Colorado, Nevada and Texas. It is shown that in 1865 the counties of North Dakota had a population of 152,000, and that population had increased to 225,000 on the 1st of January, 1888. Five-sevenths of the area of the United States, excluding Alaska, lies west of the Mississippi River, with a population of 10,000,000, and the other two-sevenths has a population of

48,000,000. A careful estimate shows that the year 1899 will show a population of 32,000,000 in the States west of the Mississippi, and it is predicted that the day is not far distant when the center of population will be forced west to the border of the great American desert.

Mayor Hewitt, in a speech before the Southern Society, of which the late Algernon S. Sullivan was president, showed that so far from the South having suffered from the "Lost Cause," it had paid them better than any other cause they ever had. "The South," he said, "never knew what it was to live and to prosper until it lost its cause. When everything that they held most dear was swept away and they were walking in the valley of the shadow of death, they came to the resurrection which is making the South the garden of this land, which is filling it with wealth earned by the arms and labor of freemen and not of slaves. And you are as proud of it as I am. You never knew what you had until you lost the frail prop upon which you had planted your fortunes. God has filled your land with every element of wealth, but it remained undeveloped in the presence of that blight. And now let me tell you that it was not you that lost the cause, but it was the protected States that lost it. The victory is coming to you, and those States that have so long relied on artificial stimulus will discover that in compelling you to become true and loyal sons of the Union they dug their own graves. That Constitution which was maintained at the point of the bayonet is the sheet anchor of the South, is the grand basis upon which their industries will flourish and their wealth increase."

The city of Hoboken has been defeated in several suits long pending, in which it claimed the right of way through property on the water front by dedication from Col. John Stevens in 1804. Judge Matthews, of the United States Supreme Court, decided to the contrary. The defendants were the Pennsylvania Railroad Company, who have extensive shops on the property in dispute, and several other corporations, who urged the validity of their grants from the State of New Jersey, based on the Riparian Rights act, which was passed after the dedication by Colonel Stevens. Had the city won the suits the demolition or remodeling of the United States bonded warehouse, the Hamburg-American sheds and the Pennsylvania Railroad repair shops would have been made necessary.

The extent to which tea production is being transferred from China to India and Ceylon appears from a statement prepared by an officer of the Imperial Maritime Customs at Shanghai. The deliveries last year of China teas comprised 134,236,000 packages, which is a decrease of 23,800,000 compared with 1886-7. During the same period India teas increased to 75,425,000 packages from 48,285,000 in the previous year, and the tea product of Java more than doubled. The current year promises even more striking results. India and Ceylon enjoy the advantage of entire freedom from taxation, which operates as a strong stimulus to tea culture.

The new Broadway Theater, on Broadway, Forty-first street and Seventh avenue, is an ideal fire-proof structure, with iron floor beams and girders, iron doors and iron lathing. The window and door cases are also sheathed with iron.

Cuban merchants and planters in the sugar trade are combining to resist the attempted monopoly in the United States.

The annual meeting of the Tehuantepec Ship Railway Company was held in Pittsburgh on Saturday. A committee, consisting of Colonel Andrews, ex-Secretary Windom and J. B. McDonald, of Baltimore, was appointed to meet in New York to-day and organize a construction company. At a later meeting the stock of the concession company will be transferred to the new organization. It is estimated that fully $25,000,000 will be needed to complete the work.

The House Committee on Commerce has ordered a favorable report to be made on the bill empowering the Secretary of the Treasury to define and establish an anchorage ground for vessels in the bay and harbor of New York and in the Hudson and East rivers; to adopt suitable regulations in regard thereto and take measures for their enforcement.

The annual report of the New York Pilot Commission states that the service is in excellent condition. Out of the 6651 vessels piloted only seven have filed complaints, and of these complaints five were dismissed. Twenty-one schooners are in the pilot service, with 131 pilots. The total sum earned last year was $430,275.

The number of building contracts already given out in Philadelphia this season gives promise that 1888 will be a year of unprecedented activity. Wages questions have been settled generally on the basis that prevailed last year.

"Savings and Savings Banks" was the subject of a lecture delivered in Boston last week by Edwin A. Stone, of the Franklin Savings Bank, of that city. He spoke at length upon the growth of the savings banks in this country, and presented statistics showing that the aggregate capital of the banks here is $1,375,000,000—$125,000,000 of which is surplus—and $1,250,000,000 being due 3,457,352 depositors. Five-eighths of this sum is held by the New York and Massachusetts banks, the former having $482,486,000 and the latter State $302,948,624, the balance being largely in the New England and middle States, only one Southern State, North Carolina, being represented. The largest bank in this country is the Bowery Savings Bank in New York city, which has over $43,770,346 of deposits and a surplus fund of $11,000,000. The deposits of the savings banks in Europe at the present time amount to £503,000,000.

The United States Senate on Monday, by a vote of 38 to 15, passed the bill to incorporate the Maritime Canal Company, of Nicaragua, after rejecting various amendments proposed by enemies of the measure. Mr. Vest came very near getting in an amendment expressly declaring that the United States Government should not be in any respect liable for the company in a financial way. Mr. Edmunds and Mr. Plumb talked earnestly in opposition to this proposal, asserting that such an express provision was unnecessary under the terms of the bill. Mr. Edmunds declared that if his vote and voice could put it there, he would add a clause to the bill making the Government a stockholder in the canal company to the extent of $50,000,000. The Vest amendment was lost by a vote of 21 to 22. Among the incorporators are Frederick Billings, Charles P. Daly, Daniel Ammen and A. G. Menocal.

While vainly attempting to repair the embankments of the Yellow River, a second catastrophe occurred and three mandarins and 4000 laborers were drowned. They are supposed to have been drawn into the gorge while endeavoring to sink large rafts to form an obstruction to the outrushing waters.

The number of immigrants arriving at the ports of the United States from the principal countries for the month of January was 13,238, against 10,302 for the same month of 1887. For the seven month ending with January the number was 236,845.

At the recent Congress of the Chambers of Commerce of the United Kingdom held in London it was stated that the receipts of railways had increased $2,500,000 during the last six months, and the foreign tonnage of 1887 over 1886 had increased 2,190,000 in British shipping alone. Ships which had for some time been laid up were now finding employment at increased freights.

A dispatch from Havana says the French Trans-Atlantic Steamship Company have furnished their large fleet with complete apparatus for dropping oil on the waves during bad weather. The company state that they only adopted the use of oil after repeated trials in bad wether, invariably followed by success.

The new steamship Lahn, the last addition to the North German Lloyd fleet, proves to be a fast sailer, having made her first trip to this port, in rough weather, in about 6 days and 22 hours from Queenstown. The Lahn was built by the Fairfield Shipbuilding and Engineering Company (formerly John Elder & Co.) of Glasgow, Scotland, is 465 feet long, 49 feet beam, 36 feet 6 inches deep, is of 6500 tons burden and has a horse-power of 10,000. The engines are of a new type, being first introduced in the Lahn. There are five cylinders working on three cranks: two high-pressure cylinders, each 32½ inches diameter; one intermediate pressure, 68 inches diameter, and two low pressure, each 85 inches diameter and with a stroke of 6 feet. The cylinders are arranged tandem fashion—the high-pressure above the low-pressure, with a piston rod common to both. The glands on top of each low-pressure cylinder are, with the glands on the bottom of its companion high-pressure cylinder, inclosed in a steam-tight casing, and the two pistons act as guides for each other, thus obviating the necessity for a guide rod proper in the high-pressure cylinder. The intermediate cylinder is placed between the others and works on the middle crank. Steam is supplied by six double-ended boilers and one single-ended multitubular boiler, each fitted with Fox's patent corrugated furnaces. The boilers are of steel and adapted for a working pressure of 150 pounds to the square inch.

The Pocahontas Coal Mines in Virginia, which aspire to rival the Connellsville coke fields, have a capacity of 5000 tons a day. The principal seam is 11 feet thick and stretches over 320,000 acres. Of this stretch 60 per cent. is being worked, with a capacity of 10,000 tons to the acre.

Edison's new phonograph, improved in essential particulars since the original machine was supposed to be complete, is now in course of manufacture at Bloomfield and will soon be put on the market. It is briefly described as nothing more in principle than what is known to mechanicians as a lathe of precision turned by an electric motor. By the vibrations of a diaphragm all sounds are distinctly repeated at the rate of 80 words a minute. It will do away largely with the service of stenographers, at least as amanuenses, and though designed for commercial and mercantile purposes chiefly, can be applied to other uses.

The Chinese Minister, Yon Hoon, while in New York City, submitted to an interview, in which he spoke of the superiority of American manufactures, particularly machinery and agricultural implements, but England had the advantage on account of lower prices. He said: "England turns out much cheaper machinery than America. It is of an inferior quality, it is true, but the difference in price is so great that unless first-class machinery is needed England is given the preference. American products of all kinds stand very high in China, and if your producers could manage to bring their prices nearly, if not quite, down to the English level, I have no doubt that they would supplant the English in very short order."

MANUFACTURING.

Iron and Steel.

What is claimed to be the largest week's work in a steel plant, under similar conditions, took place on the week ending with the 25th ult., at the Clapp-Griffiths steel plant of Oliver Bros. & Phillips, on the South Side, Pittsburgh. The works contain two 1½-ton converters, and the product for that week was 1000 tons of finished steel billets.

The new shops of the Pittsburgh Bridge Company, on Thirty-sixth street, Pittsburgh, are almost completed. When they are put into operation they will increase the capacity of the works over 50 per cent., making it about 67,000 tons. Three new buildings, about 200 x 90 feet, have been erected, with a new office on Thirty-sixth street.

The Billings & Spencer Company, of Hartford, Conn., manufacturers of drop forgings, have elected the following officers: Directors: Charles E. Billings, Miles W. Graves, Henry P. Stearns, Christopher M. Spencer, L. H. Holt, Silas Chapman, Jr., and E. H. Stocker. Officers: Chas. E. Billings, president; E. H. Stocker, secretary; L. H. Holt, treasurer.

The works of the Eastern Forge Company, at East Deering, Me., which were destroyed by fire some months ago, will be rebuilt on a larger scale than before. Work has already been commenced.

Notwithstanding a reduction of about 15 per cent. in wages by the Western Steel Company, of St. Louis, the steel department of the company's works resumed operations on Monday, the 20th ult., giving employment to about 1000 men. During the two months which the works were idle the company added a large quantity of new and improved machinery to the plant.

A number of extensive improvements are being made in the steel-plate department at the works of the Spang Steel and Iron Company, Limited, at Etna, near Pittsburgh. Three new furnaces are being built, one for annealing tests and two new heating furnaces. This firm is crowded with orders, and it is almost impossible to obtain enough steel from the melting department to keep the mill in operation.

The mill of the Alabama Rolling Mill Company at Birminghem, Ala., went into operation on the 27th ult. with capacity of some 25 tons of bars a day. A plan is already matured for a considerable addition to the plant.

On the 27th ult. fires were lighted in gas furnaces which have been substituted for coal furnaces in the bar mill and under one battery of boilers by the Birmingham Rolling Mill Company, at Birmingham, Ala. Two similar furnaces are in course of construction in their forge and the substitution will be carried through the plant if the present experiment results satisfactorily.

The Christiana Iron Works at Wilmington, Delaware, are closed, the lease of the Christiana Rolling Mill Company, which expired on December 31, 1887, not having been renewed.

The Phœnix Iron Company, of Phœnixville, Pa., are gradually dispensing with their Hungarian laborers and replacing them with Americans. It is said that the company had considerable trouble with the foreign laborers and are glad to get rid of them.

The fillers and keepers' helpers employed at the blast furnace of the Bellaire Nail Works, of Bellaire, Ohio, have received a voluntary advance in wages of 10 cents per day. The reason for the increase was occasioned by the recent remarkable work of the furnace and is not an increase in wages per ton, as the same number of men are now employed as when it was producing only 125 tons per day. The steel plant and nail department of the above firm commenced operations some time age, and at present every department of the works is running to its full capacity.

The King Iron Bridge and Mfg. Company, of Cleveland, Ohio, have been awarded the contract for the ironwork for two aqueduct bridges for the North Poudre Land and Canal Company, Larimer County, Col. They are both to be combination trusses of the Pratt type, one 80 feet and one 60 feet span.

The trouble at the Troy Iron and Steel Company's works at Troy, N. Y., has at last been amicably adjusted in the departments. In all the departments but one—the Albany Iron Works—a settlement was reached about three weeks ago by the men accepting the 10 per cent. reduction proposed by the company. The iron works department declined to accept the reduction, however, until late last week. The works employed about 800 men, the majority of whom were willing to accept the company's terms and return to work with the other men. About 40 men, however, employed on one branch of the work held off and kept all the hands from returning. A settlement was finally reached, and Saturday morning all the fires were lighted preparatory to starting up full handed Monday night. This resumption of work in all the departments is regarded with great satisfaction by business men throughout Troy. There have been a number of changes made among the superintendents and heads of departments with a view of curtailing expenses, and these, with the reduction in wages, it is hoped, will enable the company to run without further inconvenience.

Week before last Riter & Conley, of Pittsburgh, commenced to replace the wooden structure of the Pennsylvania Tube Works, in that city, with an iron building. It is expected to be completed by July 1 next. The dimensions are 260 feet wide by 363 feet long. The entire concern will cover 2½ acres and will cost about $100,000. The iron structure is being built around the old one, so as not to interfere with the operations of the works.

The trouble between Carnegie Brothers & Co., Limited, proprietors of the Edgar Thomson Steel Works, at Braddock, Pa., and their employees, occasioned by the firm demanding a reduction of 10 per cent. in wages, is still unsettled, and from present appearances an extensive strike is probable. On Friday, the 24th ult., a conference was held between the workmen and the firm at Braddock, Capt. W. R. Jones representing the firm, while the Mill Committee represented the members. The Mill Committee presented the demands of the workmen, which were as follows: That the question of a 10 per cent. reduction be referred to arbitration, but that the arbitration only have the power to fix the rates of wages until July 1 next. Several reasons were given in support of this request, the most notable being that prices are likely to change considerably before next summer ends. Captain Jones, on behalf of the firm, replied that such a demand could not be granted. He further stated that the firm was willing to refer the matter to arbitration, but only if the wages decided upon would continue for one year. The workmen's representatives then discussed the question among themselves, and finally renewed their demand, and stated that it was their ultimatum. They said the firm could do one of two things to prevent a strike; it could accept the demand or continue to pay the old rate of wages. Mr. Jones could give no definite answer until he again conferred with the firm. The workmen, therefore, agreed to allow the firm four days to give a definite reply. If the demands of the workmen are not granted a general shut-down of the works will probably follow. At present there are only two furnaces at the plant in operation, employing about 300 men. If a strike is declared these furnaces will, of course, have to be blown out. It is also stated that the workmen at the Lucy furnaces, which are owned by the above firm, will be ordered to cease work if a strike is declared.

In our issue of last week we made mention of the assignment of Graff, Bennett & Co., large iron manufacturers at Pittsburgh, to P. H. Miller, of that city. Since that time John S. Slagle and George A. Laughlin have been appointed appraisers of the firm's property. The assignee has been authorized to continue operations at the Clinton and Grafton blast furnaces until all the raw material is worked up. Both furnaces will then suspend operations till the affairs of the firm are arranged. Mechanics' liens were filed against the firm on the 23d ult. by Totten & Co. for $8,498.95 for machinery, and by Wm. Dichey, Jr., for $4900 for lumber furnished. On Wednesday, the 22d ult., the Sheriff took charge of the various mills of the concern with the exception of the blast furnaces. The works seized were the two rolling mills at Millvale and the Clinton mill on the South Side. In the neighborhood of 1300 men were employed by the firm and are thrown idle by the suspension. A meeting of the creditors will be held at an early day, though the exact date has not yet been decided upon. It is the general impression that the mills and furnaces will be sold for the benefit of the creditors, and that the firm will retire from business.

The Swindell Construction Company, Lewis Block, Pittsburgh, have received a contract from the Syracuse Tube Company, of Syracuse, N. Y., for the erection of a regenerative gas coupling furnace, making three furnaces of this design which they have built for this concern.

The Spaulding Iron Company, at Brilliant, Jefferson County, Ohio, have been compelled to close down their nail works for the present and withdraw from the market. The shut-down was caused by the demand of the nailers in the Amalgamated Association to re-employ the old heaters who withdrew from the mill last summer when the draft furnaces were replaced by the Smith regenerative gas furnaces, and new heaters were put on, which action was had by the advice and consent of the nailers themselves. This change of tactics was made since the nailers joined the Amalgamated Association. The company decline to discharge their old heaters, preferring to close the mill. The wage question does not enter into the matter, as the mill, ever since last July, has been paying the Mingo scale.

The Phœnix Iron Company, of Phœnixville, Pa., have posted notices in their mills that on and after March 5 a reduction of 7 per cent. will be made in the wages of all mill hands except common laborers. Puddlers' wages will also be reduced from $3.75 per ton to $3.50. It is expected that a similar scale of wages will be adopted by other establishments in the Schuylkill Valley.

The annual meeting of the Tennessee Coal, Iron and Railroad Company will be held April 2. For January the surplus earnings over operating expenses and taxes were $64,500; interest, $17,500; surplus, $47,000. The total estimated earnings for fiscal year, $627,500; earnings on investments, $138,400; net earnings over operating expenses, $765,900; interest payments,

$278,200; sinking fund payments, $86,900; net surplus earnings over fixed charges fiscal year ending January 31, 1888, $401,700. This is an increase in net earnings (with no new furnaces in operation) of $338,673. Three of the new furnaces are expected to be blown at an early day. The estimated fixed charges (coupon interest and sinking funds) for the current fiscal year are $37,000 per month, or $444,000 for the year.

The Glendon Iron Company, at Easton, Pa., on Saturday, the 18th ult., blew out one of their furnaces, and on Tuesday the 31st ult., commenced to blow out another. This makes four furnaces blown out since November 26. The trouble is caused by poor coal. The furnaces use Lehigh coal, and, though they can secure other kinds, they are found undesirable. Ore miners, quarrymen and machinists are also being laid off, over 100 now being out of work.

Machinery.

The Lexington Model and Machine Works is the title of a new company recently founded at Lexington, Ky.

Tappery, Steel & Delaney, Petersburg, Va., are preparing to add to their machine works the building of light locomotives.

The Ætna Machine Company, of Warren, Ohio, have just closed their large contracts for works, as follows: One with the Globe Rolling Mill Company, of Cincinnati, Ohio; one with the Iowa Rolling Mill Company, of Burlington, Iowa; and one with the P. Hayden Saddlery Hardware Company, of Columbus, Ohio.

In our issue of last week we made mention of the fact that R. K. Porter & Co., of Pittsburgh, builders of light locomotives, had distributed a portion of the profits of the past year among their employees. At a meeting of the employees of the firm held a few days ago the following resolutions were unanimously adopted:

Whereas, Our employers, R. K. Porter & Co., again having most generously favored us with a voluntary contribution and an expression of good will, and in recognition of their highly appreciated efforts, the affability, sympathy and liberality shown us in the past, we, the workmen assembled, do most heartily

Resolve, That we have been made happy and feel very grateful for the unexpectedly large distribution of money to us for the last year.

Resolved, First, that it is the practical unanimity of feeling on our part to heartily cooperate with our employers to make the business a success and continue the very pleasant relations now existing. Second, That we are of the opinion that if the system adopted by Mr. R. K. Porter would become general it would be the means of preventing strikes, and would create a better feeling between employer and employees. Third, That a duplicate of these resolutions be printed in the daily papers, and an engrossed copy be framed and sent to R. K. Porter & Co.

Sebastian May & Co., Cincinnati, Ohio, builders of machinists' iron and brass working lathes, who were recently burnt out, have now completed rebuilding and are again in good running order, with increased manufacturing room, in which is being placed new and additional machinery to the extent of $3000. The demand for their lathes, it is reported, is very large, with every prospect of a continuance of a large trade.

Israel H. Johnson, Jr. & Co., 1422–1426 Callowhill street, Philadelphia, Pa., builders of machine tools, have just received an order from the Scott foundry department of the Reading Iron Works, for a 42-inch swing by 21 feet engine lathe of their new pattern "triple gear." They also recently placed in the National Rolling Mills, at McKeesport, Pa., one of the same size lathes as the above, and one of 36 inches in the Barr Steam Pump Works, Germantown Junction, Philadelphia, and in the Newton Machine Tool Works, Philadelphia, a 36-inch lathe, and two of their new style "triple geared" 30-inch swing in the Pittsburgh Locomotive and Car Works, at Allegheny, Pa.

Hardware.

The attention of our readers is called to an advertisement among "Special Notices" offering for sale a patent for a valuable improvement in mortise door locks.

The Hartman Steel Company, of Beaver Falls, Pa., have completed their copper wire department, and are now prepared to furnish all sizes of copper wire for electric and other purposes. The machinery for their web fencing, a novel article with center wires through every mesh, is also now in operation, and this, in connection with their steel picket fence, constitutes another important department to their works.

Among our advertisements this week is that of Henry Tregellas, the patentee of a reversible nut and pipe wrench, who desires to sell the patent for a reasonable sum or to engage in manufacturing the wrench with a responsible party, or will arrange for its manufacture on royalty. Lack of capital is his motive for offering special inducements to interested manufacturers.

The Chicago Drop Forge and Foundry Company have taken the plant at Kensington, Ill., formerly used for manufacturing horse shoes under a patent process, have greatly enlarged it, stocked it with machinery, and are now running on full time in every department. They make all sorts of agricultural drop forgings, car couplers, &c. Their drop-forging plant is claimed to be one of the finest in the country. They have added to it the plant of the Cleveland Machine Company for the manufacture of shears and scissors. They have very recently put this new department in operation, and are now turning out about 50 dozen pairs a day. Their best grade of shears and scissors are drop forged from solid steel of the finest quality. Kensington is a suburb of Chicago, and is situated near Pullman. Morris Sellers is president of the company and R. H. Lewis is vice-president and general manager.

The Gaudron Iron Wheel Company, Toledo, have recently increased their capacity for the production of their goods fully 100 per cent. by the addition of a new brick structure immediately adjoining their former premises, four stories in hight and measuring 160 x 100, employing 250 hands. The company contemplate the erection shortly of an additional building, to be devoted entirely to the production of their well-known iron wheels.

The Gibbs Lawn Rake Company, Canton, Ohio, will, on account of inadequate capacity and manufacturing facilities, begin the erection of a large brick structure at an early date, which will insure them more than double their present output. They will also add several new specialties to their already large line, chief among which will be a new form of lawn rake, embodying a number of special features and improvements.

The Mansfield Steel and Nail Works is the name of a recently incorporated company located at Mansfield, Ohio, with the following officers: Wm. H. Taylor, president; L. Ludlow Moore, vice-president and secretary; and Peleg Swift, general manager, the two latter gentlemen for many years past having been connected with the Standard Nail and Iron Works, located at Middleport, Ohio. The company have secured in the new manufacturing district of the city some 3 acres of ground upon which has been erected substantial buildings, 75 x 150 feet, to which will be added a warehouse, 40 x 80 feet, and a separate building for office purposes. The nail mill at present is supplied with 30 machines, which will be supplemented by 20 more now in course of construction, the total capacity of which will be 275 kegs per day. Their specialty will be cut steel nails, embracing basket, chair, clout, fine finishing, Hungarian, shoe, keg and barrel nails. They are already busily engaged in filling orders and report prospect very encouraging for continued success.

The Allegheny Tack Factory, owned by Morgenstern, Mallaby & Co., Allegheny, was partially destroyed by fire last week, causing a loss of about $15,000. The factory has been in operation about four years.

The circular of the Syracuse Forging and Gun Company, Syracuse, N. Y., illustrates the new Baker gun, of which they are manufacturers, and gives a full description of its special features. The works of the company are located on Basin street, and cover an area of 300 x 150 feet, and are devoted principally to the manufacture of the gun, a description of which was given in our columns a few months since. Operations for the making of this gun were begun April, 1887, and the company are now running full with upward of 70 men, and turning out 300 guns a month. This output will be increased shortly to 600 a month. This plant embodies a main building which includes shops for the construction of tools and machinery, forging and finishing work. Connected with the main building is the milling machine room, 20 x 124 feet, containing 25 milling machines and other necessary machinery.

The firm of McCaffrey & Bro., Philadelphia, manufacturers of files and rasps, have just completed a new building for forging. It is a one-story brick, 30 x 150 feet, and is especially designed for the comfort of the workmen, having excellent light, ventilation, &c. The firm, who are over a quarter of a century old—having been established January 13, 1863—have thus increased facilities for manufacturing their well-known line of files. They refer to the fact that in all this period they have refused to enter into combinations or trusts of any kind, depending on the quality of their goods as the basis of their success. In addition to the sale of the goods in this country they mention the fact that they have some export trade.

Miscellaneous.

A dispatch from Fairport, Ohio, under date of the 24th ult., reads as follows: "An evidence of the dullness of the ore business is found in the fact that not a single vessel has yet been chartered to bring ore to the Lake Erie ports. Almost all the ore received here is owned by furnaces at Pittsburgh and in the Mahoning Valley, and is handled by the Pittsburgh Western Railroad at present, though there is a prospect of the Pennsylvania Company having a line to the same point the coming season."

A contract has been concluded between the Great Falls Water Power Company, of Montana, and the Montana Smelting Company for the erection of smelting furnaces at the Great Falls of the Missouri on a large scale. A St. Paul dispatch says contracts for the buildings and plant have already been made, 25,000 tons of metal from Montana mines contracted for, and the new works will be in active operation by August of the present year. The capital stock of the new company is $1,500,000. The plans call for the expenditure of nearly $2,000,000 for the erection of furnaces and structures to accommodate the business that is to be done.

A company, among whom are William Partridge, William McCutcheon and Rowley Smith, has been formed, with a capital of over $100,000, to manufacture blast-furnace brick, in Pittsburgh. These brick are made from the cinder of a blast furnace, and are as smooth and hard as flint.

The Iron Age

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JAMES C. BAYLES AND
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JOHN S. KING, - - - - BUSINESS MANAGER.

The time is at hand now when raids on the market seem to be in order. As long as business is active and there is a steady demand for the entire output of every establishment capable of turning a wheel, there is a pleasing stability to prices, and manufacturers are not over anxious to make sales. With a turn in the tide, however, and a perceptible slackening of the demand, comes a decided change in the attitude of producers, especially among those who are obliged from any reason to keep up their output to its maximum. They are responsible for the periods of extreme weakness in prices which are reported, sometimes affecting one commodity and sometimes quite a number. For several months there have been alternations of weakness and steadiness in most branches of the iron trade, which can be traced in a large number of cases to the effect of a determined search for orders by some manufacturer who must have, or fancies he must have, full work for every department of his establishment. One or two such concerns in every branch of trade can demoralize the entire business of the country. Others may act with discretion in endeavoring to get orders, but the raiders are responsible largely for rapid declines in values, which occur in spite of the efforts of the more conservative to keep prices steady.

The Resources of Tasmania.

Tasmania is one of the tin-producing colonies of Australia, and as such attracts more attention while the price of tin remains so exorbitantly high. Tasmania is an island at the southern extremity of the continent of Australia, from which it is divided by Bass's Straits, 120 miles wide. Tasmania was discovered in 1642 by the Dutch navigator Abel Jan Tasman, and by him named Van Diemen's Land, the name by which it was known down to 1853. It was not discovered to be an island until 1797. It was formally taken possession of by England in 1803, and made auxiliary to the penal settlement at Botany Bay. Tasmania is one of the most healthy of the British colonies, and is never too hot in summer nor too cold in winter for outdoor occupation to be carried on; nor is it subject to the droughts experienced in the other Australian colonies. From observations taken at Hobart Town for 1885 the mean temperature of spring was 54°, summer 62°, autumn, 50°, winter 46°, and of the whole year 54°. Rain fell on 176 days in the year, and the rainfall is a little more than 28 inches.

All the principal towns are united by telegraph, there being 1635 miles of telegraph (with 2071 miles of wire) open in the colony. Besides the coastwise intercolonial communication by steamer, there are four ocean steamship lines connecting the island with Europe and San Francisco. There are 240 places in Tasmania where post offices are established. The island contains 15,500,000 acres of land, and the islands connected with it contain 1,250,000 acres, 4,461,013 having been sold or granted to settlers by the crown. There are 442 miles of railway in the colony constructed or in construction, mainly on the 3-foot 6-inch gauge.

The exports of the island are principally wool, tin, grain, fruit, preserves, gold, hides, skins, leather, hops, sperm oil, timber, vegetables and tanning bark. The value of tin and gold exported in 1885 was—tin, £357,507; gold, £141,319. The land in cultivation on 31st of March, 1886, was 417,477 acres; there were in the colony 138,647 horned cattle and 1,648,627 sheep. The quantity of wool exported in 1885 was 5,774,142 pounds, valued at £260,480. Tasmania possesses a great source of wealth in her minerals, some of which are now being turned to account. Coal, abundant and of good quality, is found in many parts of the island.

Iron ores exist in abundance, and iron of the finest quality has been produced from them. Tin in very large deposits has been discovered at Mount Bischoff, the leading district. Tin production in Australia proper reached 11,000 tons five years ago, but has since been falling off gradually to 9000 tons per annum because of the low price in the world's markets. Now that high prices are ruling it is certain that the former maximum figure or a production even beyond it will soon be reached, and Tasmania is likely to contribute a goodly portion toward this larger output. There exists in the island an enormous lode of bismuth, said to be the richest in the world. Copper, silver and antimony are also found, the copper ore yielding as much as 30 per cent. of metal. Along the northern coast is to be found slate of first-rate quality. On the elevated plateau which occupies the center of the island are numerous lakes, which by means of irrigation might be made to spread fertility over a large area and furnish rich pasture land for stock.

On April 3d, 1881, the population of Tasmania was 115,705. In addition to private schools there are 194 Government schools, having 15,418 scholars on the rolls. Hobart is a city of considerable size containing, in 1886, 29,987 inhabitants. Launceton, the second town of the colony, contains within the registration boundary a population of 18,628 persons and is rapidly progressing. There are five banks established in the colony with together 28 branches. The total deposits on December 31, 1885, amounted to £153,622. The public debt amounted in 1885 to £3,357,000. The revenue, which had been £327,017 in 1876, was £571,397 in 1885, while the expenditure was £341,889 and £584,047 respectively. The imports amounted in 1876 to £1,133,003, against £1,757,486 in 1885, while the exports were £1,130,983 and £1,313,693 respectively.

As we have shown, Tasmania, by reason of her geographical position, great resources of every kind and fine climate, is well calculated to attract immigration on a larger scale and through an increase of working population to advance materially as a productive country, comparing well in the near future with her sister colonies on the Australian continent. A more active working of her tin deposits may have a material share in bringing about the anticipated increased prosperity.

The great copper syndicate continues to occupy the press on both sides of the Atlantic considerably, and it is becoming a more and more difficult matter to sift the truth from the mass of guesses and conjectures printed almost daily. One by one meetings of shareholders held bring official confirmation of the reports of the surrender of producers to the manipulators of the metal, the last being the Arizona Copper Company. In reality only one significant detail has come to light, and that is the report that the contracts of the syndicate with the mines, or at least some of them, contain a clause which allows the *Société des Métaux* to order a restriction of output to the extent of 10 per cent. Thus far the directors of the mining companies, whose reports at their shareholders' meetings have got into the public prints, have spoken in a vague way of the advantages accruing to them by entering into the great combination. Generally they contrive to create the impression that they have driven a particularly good bargain, and it is not remarkable that the terms favorable to the syndicate are not specially alluded to. But it would appear now that the syndicate has not only allowed for a possible increase in the production, which the mining companies have generally alluded to, but that it has provided for the contingency of too exuberent an output by outsiders. If M. Secretan finds that he must take care of too much outside copper, he may deem it expedient to cut down the make of the concerns upon whom he has his grip. It is pretty broadly hinted, too, that those who may be induced to prey on the syndicate by pushing mines not in the corner or by developing new mines may find the syndicate active bears of such copper stocks. It is certain that those who are engineering this gigantic speculation must, in self-defense, do all they can to discourage new ventures which might add to the load of copper to be carried. A good deal of exaggeration has been indulged in concerning the increase in the copper consumption growing out of the rapid spread of electric lighting. It is reported that four of the largest manufacturers of copper wire for electrical purposes in this country used 13,500,000 pounds of copper in 1887, as against 10,000,000 pounds in 1886. This, it is true, is a very handsome increase, but after all it is only a fraction of the entire copper consumption, which has not grown at any such rate. It must be considered, too, that the introduction of the alternating system means a very marked decrease in the quantity of copper used for electric light lines, and that the great difference in price between iron and copper wire will certainly retard the substitution of the latter for the former for telegraph lines, which had begun so auspiciously. It is estimated that the increase in the consumption in the United States in 1887 over 1886 was about 13 per cent. It is evident that an advance of fully 50 per cent. in the price must necessarily cut off considerably an increase in the demand created by a long period of low prices, and by the extraordinary activity in consumption of all

metals, as proven by the unprecedented demand for pig iron, lead, zinc and other articles during 1887.

Our Trade With Canada.

Owing to the fact that under an antiquated law our Bureau of Statistics has no means of compelling a statement to be made of the exports of goods to our neighboring countries, Mexico and Canada, shipped by rail, the result is that our export statistics, so far as they relate to these countries, are very deficient and inaccurate, while those of at least our Northern neighbor must necessarily be as complete as the necessities of the customs call for. Thus, for the fiscal year ending June 30, 1887, the returns of our own Bureau of Statistics show exports of domestic goods of $33,495,403, to which must be added $2,666,944 exports of foreign goods, a total of $36,162,347. Against this the reports of imports into Canada from the United States give, for exactly the same period, a total of $45,107,066. Obviously, therefore, we must look to the official documents of our neighbors for correct data concerning the trade done between the two countries. The total imports into Canada entered for home consumption were $105,639,428, of which $78,120,679 were goods which paid a duty of $22,438,308.73, and $27,518,749 was duty free. We rank first, with $45,107,066; Great Britain following with $44,962,233; Germany with $3,235,449, and France with $2,073,470; China, Japan, the Spanish West Indies and Brazil each contributing a little over $1,000,000. The exports from Canada aggregated $89,515,811, of which $44,571,846 went to Great Britain, $37,660,199 to this country, $2,075,411 to the West Indies, and $1,718,604 to Newfoundland, all other countries receiving less than $500,000.

In the particular lines in which the readers of *The Iron Age* are interested the volume of business naturally varies considerably. In iron and steel the quantities of goods sent to Canada are small, and it is probable that even these amounts would be considerably cut down if we possessed the means of tracing those goods credited to the United States which merely passed through our country in transit from other parts of the world. We have computed below a table showing the value of goods imported into Canada from the United States, from Great Britain, and the total imports:

Imports of Iron and Steel.

	United States.	Great Britain.	Total.
Anvils	$484	$4,949	$5,383
Axles, axle bars and blanks	970	25,492	28,386
Band and hoop iron, No. 17, and thinner	10,165	49,637	59,802
Band and hoop iron, thicker than No. 17	651	73,147	73,798
Bar iron	33,219	817,593	871,135
Boiler Plate	20,705	152,898	175,058
Bolts and nuts	4,513	472	4,985
Bolts, washers and rivets	18,524	11,620	30,144
Iron furniture	621	19,244	19,886
Canada plates	619	180,305	180,924
Car wheels	7,759	5,061	46 096
Castings, n e.s., and forgings	214,258	42,954	261,988
Cast Iron pipe	29 788	167.187	206,375
Chains over 9-16 inch	3,683	29,287	33,088
Chain cables	4,481	50 604	57,897
Locomotives	72,804		72 804
Fire engines	2,900	10,561	13,161
Engines and boilers	42,869	1,758	45,126
Ferro, spiegel, bloom-ends, crop ends	150	1,285	1,435
Iron blooms, muck bar	8,916	412.408	421.598
Iron bridges and structural work	43,201	86,541	140,062
Malleable iron castings	30,623	78	30,7 1
Nail plate, 16 and thicker	....	10,159	10,764
Nail and spike rods	....	19,039	22,605
Charcoal pig (3,919 tons)	77,420	.....	77,420
Pig Iron	131,572	422,736	554 388
Iron Rails	3,167	22,593	25,760
Fish plates, frogs, &c.	4,940	144,091	149,031
Rolled beams, channels angles and tees	22 872	141,687	178,639
Sheet iron, No. 17 and thinner	15,338	3 8,487	327,825
Sheet iron, thicker than No. 17	2,280	51,950	54,288
Tubing, not threaded, over 2 inch	5 994	67,282	77,554
Tubing, threaded, over 2 inch	32,112	45,406	77,961
Tubing, under 2 inch	34,179	167,254	236,180
Lap welded boiler tubing, 1½ inch and over	5,186	3,637	60,644
Other tubes	863	3,499	4,362
Coil and other springs	9,047	1,645	10,692
Locomotive tires	4 104	16 357	41,793
Steel ingots and bars	66,302	347,389	425,019
Steel sheets, under 3-16 inch	4,601	54,246	59,414
Steel sheets, thicker than 3-16 inch	30,252	60,363	90,615
Manufactures of steel, n.e.s.	39,624	48,169	91,525
Free Goods:			
Wire rods, under ½ inch (Belgium, $52,357)	80	485	52,357
Scrap iron and steel	11,167	184,254	205,051
Iron and steel beams, sheets, plates, &c., for ships	2,499	24,997	27,496
Locomotive tires	923	8,069	19,940
Steel rails (85,613 tons)	32,980	1,629,281	1,712,261
Steel for skates	208	7,407	7,615
Steel for saws	30,074	51,974	82 048
Steel strips for fencing	....	9,473	18,070
Crucible sheet steel for reaper knives	....	2,163	2,163
Sheet steel for springs, corset steel, &c	1,244	9,970	11,214
Steel for shovels and spades	7,604	9,977	17,581

The only items in which the United States holds any business worthy of consideration is in castings, machinery, bridgework and charcoal pig. In metals and manufactures thereof the position is somewhat more favorable, as the table given below proves:

Imports of Metal Manufactures.

	United States.	Great Britain.	Total.
Brass tubing	$13,006	$10,547	$23,553
Brass bars and bolts	2,719	455	3,174
Brass strips	459	1,188	1,647
Brass wire cloth	7,837	5,598	13,501
Brass manufactures, n.e.s	282,385	65,015	367,376
Clocks and parts thereof, except springs	111,010	13,460	134,116
Copper, bars, rods, bolts, ingots and sheathing	26,819	59,023	85,842
Copper, seamless drawn tubing	10,868	5,981	16,849
Copper wire cloth	2,637		2,637
Copper manufactures, n.e.s	6,481	20,202	28,464
Lead, old, scrap and pig	11,662	161,737	173,477
Lead bars, blocks and sheets	1,611	39,731	41,746
Lead pipe	280	4,349	4,729
Lead shot	1,196	4,760	5,956
Babbit metal	4,087	49	4,136
Britannia metal, mfgs. of, not plated	46,326	5,022	52,048
Bronze or dutch metal	3,577	232	7,829
Bronze statuettes	3,625	1,727	6,880
Phosphor bronze	1,343	1,704	3,047
Japanned and stamped ware, n.e.s	20,535	3,706	24,594
Gas, coal, oil and kerosene fixtures	63,281	3,439	68,757
German silver, manufactures of, not plated	12,763	14,294	27,879
Nickel-plated goods	3,682	1,133	5,810
Nickel anodes	2,890	742	3,632
Pins	13,551	21,426	36,702
Type	32,653	35,373	68,036
Tinware	119 512	17,040	144.880
Zinc, manufactures of	5,454	803	6,463
Sheet copper (free)	84 631	59,460	144.091
Spelter in blocks	2,438	9,214	25,007
Tin in blocks	73,258	174,723	250,564
Tin plate	60,861	706,975	767,836
Tinfoil	17,022	2,573	22,542
Brass wire	24,418	11,416	36,383
Copper wire	38,229	9,134	47,363
Copperod spring steel wire for mattresses	15,400	12,198	29,386
Galvanized or tinned iron or steel wire, No. 15 and smaller	44 329	32,286	85,740
Yellow metal in bars for sheathing	3,918	47,384	51,631
Zinc in blocks, pigs and sheets	3,367	42,382	98,557

In some lines, as in the manufactures of brass, in clocks, britannia metal, gas and oil fixtures, tinware and manufactures of copper, we have a goodly share of the total trade which Canadian manufacturers have been unable to control entirely.

It is in the higher forms of iron and steel manufactured goods that the principal business with Canada is done. Below we have compiled a table of the imports of heavy and shelf hardware and edge tools:

Imports of Hardware.

	United States.	Great Britain.	Total.
Builders', cabinet, harness, saddlers' hardware, tinsmiths' tools	$430,724	$66,191	$504,179
Carriage hardware	86,393	5,514	91,878
Housefurnishing hardware	204,249	35,297	244,876
Hardware, n.e.s	1,924	3,697	5,631
Hollow-ware, tinned, glazed or enameled	20,147	96,198	117,962
Sheet iron hollow-ware and manuf. of sheet iron, n.e.s	16,591	14,244	30,898
Horse-shoes and horse-shoe nails	3,547	.....	3.547
Locks	69,845	13,421	83,410
Hungarian and clout nails	1,433	2,094	4,579
Wire nails	2,362	1,630	9,551
Composition nails and spikes	1,451	4,262	5,713
Wrought nails and spikes	6,409	8,326	14,735
Cut nails and spikes	5,976	1,008	7,004
Nuts, n.e.s	1,078	841	1,919
Pumps	14,034	1,221	15,255
Wood screws	2,890	31,192	34,082
Scales and balances	24,381	1,865	26 656
Skates (Ger.)	3,645	376	26,004
Stoves	19,724	580	20,307
Tacks, brads and sprigs	7,667	1,564	9,268
Barb wire	3,964	1	3,965
Buckthorn fencing	651	....	1,591
Covered wire	2,232	40,566	52,244
Wire, No. 15 and coarser	29,755	200,336	285,044
Wire rope	4,440	16,181	20,621
Wire work, n.e.s	78,667	16,915	105,166
Knives	773	20 632	31 207
Cutlery, n.e.s	45,744	269,846	345,901
Files and rasps	35,212	38,482	74,889
Firearms	55,286	48,299	120,901
Machine needles	12,401	6,175	18,743
Knitting needles	3,183	24,175	27,574
Axes	7,556	619	8,182
Saws	55,395	4,829	61,247
Carpenters', coopers' and mechanics' tools	134,018	49,123	250,747
Edge tools, n.e.s	5,796	364	6,160

It will be noted that in these lines the share taken by the manufacturers of the United States is by far greater than that of other countries, not excluding Great Britain. This is particularly true of builders', cabinet and house-furnishing hardware, which together amount to $635,000, and in mechanics' tools. In other branches the total trade is not large, but a good deal of what there is of it is controlled by this country.

The following data on the imports of agricultural implements show clearly that the Dominion is practically independent in this line of manufacture. The imports from Great Britain are insignificant, and those from the United States are very small, being less than $100,000.

Imports of Agricultural Implements into Canada.

	United States.	Great Britain.	Total.
Harrows	2,852	....	2,852
Harvesters	3,638	...	3,638
Hoes	1,152	238	1,390
Hay, corn, and chaff cutter knives	258	529	787
Mowing machines	5,995	...	5,995
Plows	9,883	609	10,492
Rakes	1,596	....	1,541
Reapers	275	...	275
Scythes	12,184	1,101	13,285
Spades and shovels	12,421	7,239	19,660
All other agricultural implements	46,594	3,678	50,708

On the whole, therefore, the trade we do with Canada in metals and their manufactures is satisfactory considering all the circumstances.

Far-seeing and frank pig iron manufacturers in the Lehigh Valley look with concern into the future, and few of them are not willing to confess, when hard pressed, that at least some of the works must go to the wall if there is any long-continued depression, unless, indeed, relief is afforded to them in some directions. The times

have passed when, from the ore to the finished manufactured bar or shape, a round profit could be added by every one who handled the material. It is particularly in the matter of ore royalties in which a reduction is imperative. Few probably are aware of the fact that some of the Lehigh furnace companies are paying $1 and even $1.50 royalty—although, of course, 50 cents is the usual figure—on New Jersey magnetites. The leases were entered into in 1872 and 1873, and are now drawing to a close. It remains to be seen whether those controlling ore property will be willing to make the concessions which changed conditions call for, or whether they must be taught a lesson by the crippling of the Lehigh pig iron industry and its gradual but otherwise certain decline in its struggle with less hampered sections of the country.

The Model Trust.

One of the most interesting events in the economical history of the country has been the publication this week of the agreement under which the Standard Oil Trust was formed. It is stated, and there is reason to believe it to be true, that large sums have been offered in the past for a copy of that famous document. For some time past, however, it has not been surrounded with the mystery in which it was shrouded years since. Thus we know that when the Eastern nail manufacturers were last fall looking for some means of putting an end to the demoralization in that particular trade, the Standard agreement was available to the committee for its guidance.

On the whole, the principles underlying this, the only really successful "trust," have been pretty accurately known for years. Briefly, the parties to the agreement had practically surrendered control of their property to nine trustees, who issued to the owners of the property trust certificates at par in an amount equal to its appraised value. The entire management of the business is practically under the control absolutely of the board of trustees, the only power resting in the hands of the holders of certificates being a voice in the selection of trustees when the term of the latter expires by limitation, or vacancies are to be filled. It is this absolute and unconditional surrender to a group of men who have wielded their power like autocrats, which has been characteristic of the Standard Oil Trust. It is admitted by their most determined foes that this small group of men has displayed phenomenal business ability, and it is asserted by them that it has been coupled with a corresponding disregard in the choice of means to accomplish a given end. However much business men may have condemned the methods employed, it is certainly true that the great success achieved has challenged admiration and has created a desire to imitate the trust.

Putting aside for the present the question to what extent public policy is endangered by such combinations, it may be worth while to consider what elements have contributed to make this model trust a success, and whether its conditions differ so materially as to make similar organizations impossible in other lines of industry.

It is widely believed that the personal element has largely entered as a factor. It is admitted that the group of men controlling the Standard Oil Trust have shown wonderful executive ability and great business enterprise, tact and courage. But it may be admitted that in other departments of trade and manufacturing talent as great could be found. The second and by far more serious consideration is whether in other lines there exists to-day or is likely to exist that preponderance of influence in the hands of a few which could make the creation of a trust possible. In the iron, steel, hardware and metal trades we do not know of one industry in which the power rests so completely in the hands of one man or a small group of men to allow them to take the initiative, with the hope of winning over important rivals, crushing out refractory competitors and keeping outsiders at bay. The effort has been made, but thus far has failed in every instance, though temporary successes have been recorded.

Up to a certain point producers, after long periods of demoralization, may be willing to make sacrifices in order to aid in establishing an arrangement for the common good, which will afford them at least a temporary relief. But very few manufacturers, large or small, have yet reached the point when they might be ready to surrender their whole business into the hands of others, sink their individuality, abdicate all control of their property, unless refusal meant absolute ruin. They may enter into agreements with their rivals and may loyally adhere to them, but at no time do they lose sight of the contingency that a rupture may precipitate a return to unbridled competition. Whether justly or not there are few manufacturers who either do not feel that they possess special advantages, or who do not believe that their capacity to inflict injury entitles them to special attention. In the sense that the Standard Oil Company is a model trust we believe that there are very few chances for successful imitation of its organization or its methods.

As far as the danger to the public at large and to smaller producers of great aggregations of capital is concerned, it is probably less pressing than is generally supposed. In one form or another great enterprises must seek and obtain powers from the State which are subject to legislative control. Safeguards thrown about the granting of charters, of patent rights and of privileges can do much to protect the general public. In this direction a good deal has been accomplished during the past four years. Right of way is granted only upon conditions limiting rates of compensation for services rendered. But the most important check to aggression of aggregated capital is the readiness with which equally powerful money interests seek to share in an exceptionately profitable business. To this must be added the fact that the majority of once great, vigorous organizations finally are honeycombed with abuses and fall a prey to dry rot, while new, pushing rivals grow from insignificant beginnings.

On Saturday afternoon, the 25th ult., Mr. Julian Kennedy, late superintendent of the Homestead Steel Works, of Carnegie, Phipps & Co., Limited, at Homestead, Pa., was presented with an elegant silver service, a token of esteem from the employees of the works. The present consists of a solid silver tea service of seven pieces and a chest of knives, forks and spoons, in all 91 pieces. The kettle bears the inscription: "Presented to Mr. Julian Kennedy by the employees of the Homestead Steel Works, February 25, 1888." Mr. John E. Jones made the presentation speech, which was responded to by Mr. Kennedy, thanking all for the kindly interest manifested in his behalf and wishing all success under the new management. Mr. Kennedy has not yet decided where he will locate, but is understood to be considering several good offers which he has received.

WASHINGTON NEWS.

(*From Our Regular Correspondent.*)

WASHINGTON, D. C., February 28, 1888.

The Committee on Ways and Means have had another flash in the pan. The revenue reduction bill promised by Chairman Mills with so much certainty a few days ago has again failed to respond. On last Friday he informed Mr. Reed, the leader of the Republican side of the committee, that the bill would be brought before them at their regular meeting to-day, and requested all the Republican members to be present. They were all there, but the bill was not forthcoming. The committee accordingly adjourned without doing anything. Mr. Reed, speaking of the subject in general, said that Mr. Mills and his bill had become a question involving a nice mathematical proposition—if it takes eight men three months to prepare the outline of a bill, how long will it take 15 men to complete a full bill.

The hitch now is whether to incorporate the two questions of internal revenue repeal and customs reduction and the free list in one bill or whether to divide it up into two propositions. Upon this subject the Democrats of the committee are not a unit. The tobacco districts, which represent a potential influence, are opposed to taking any chance of failure by making their proposition carry the customs schedule as a rider. They have notified the committee that they will not support any measure until their own interests are recognized. The committee are fearful that if the internal revenue repeal measure gets before the House as a simple proposition it may be passed in such a form as to make the move against the customs revenue an uphill if not a fruitless effort. Before the bill will be laid before the committee this side issue will have been disposed of. It is now promised on Thursday to bring the matter up, but this is now extremely doubtful, so that the whole matter may go over until next week. There are some points in the tariff bill which are still unsettled. The questions of coal, iron ore and fish are yet open to discussion. The duty on steel is still held at $11, and pig iron is now figured at $5 duty a ton. Tin plate is let alone.

Mr. Randall has his bill ready for action as soon as the committee makes a move. The metal schedule has been prepared practically under the auspices of the metallurgical industries, as there has been much correspondence and consultation with them. They pointed out such places where reductions might be made. The bill fixes steel rails at $13 a ton, and leaves iron ore coal and pig iron as they now stand. The internal revenue feature, in addition to repealing the tobacco tax, puts whisky down to 50 cents a gallon.

Ex-Governor Long has a duplex revenue reduction scheme, prepared by the Home Market Club, of Boston, which he will introduce. This is designed to furnish the basis of a Republican position on the subject. He cuts the sugar duty down one-half, and makes a slight reduction on customs where it can be done without jeopardizing the interests of industry.

CORRESPONDENCE.

The Brown-Bonnell Bar Iron Extra Schedule.

To the Editor: The idea of revising the schedule of extras is a familiar one to most manufacturers, and its advisability is generally conceded. Whether the present is an opportune time for such an innovation we have reason to doubt, for we are verging on one of the extremes of commercial experience, the low tide where no uniform schedule of extras is respected, and when many offer at ruinously low figures in their desire to secure trade in times of depression. In seasons of prosperity the present schedule of extras can be maintained to a large degree, so that a middle ground must be chosen that will fairly consider the extremes of trade. We are in favor of concerted action, not only on the part of the manufacturers, but of the Western and Eastern associations, in this matter, and we are convinced that a uniform and equitable scale could be agreed upon and adhered to that would do much to steady the market by reducing the apparent variation in prices of extra sizes in dull and fair times. Of course individual action in this matter would have but temporary significance, for they could rescind or revise their schedule at will.

A PITTSBURGH MANUFACTURER.

To the Editor: We do not, of course, know how the firm who issue the new schedule make or estimate the cost on "extras" in their mill. But if the same work, care and material is used in their lighter sizes that we use in ours, the old Western list was none too high. All our lighter sizes are practically a double refined iron. We regret, too, on account of our merchant friends that the list was issued, as their margins are none too large on "bar iron" in any case.

CHICAGO.

To The Editor: The card adopted makes the advance sizes as close to cost as the base. There is no reason why manufacturers should sell iron, where the product of a mill is from 6 to 10 tons per day, at the same profit per ton, that they would where the product of a mill is 25 tons per day. While they sometimes do so during times of depression they cannot afford to do so, and must have more on a good market. We also fear that the new card would work to the disadvantage of those who buy to sell again. As a rule, merchants do not get any too much profit out of handling iron. YOUNGSTOWN.

Imports of Swedish Iron.

To the Editor: We would like to know how much Swedish pig iron, Swedish manufactured iron and Swedish ore, if any, was brought to this country last year.

Yours truly, T. A. M.

CINCINNATI, OHIO.

The Bureau of Statistics publishes details of the sources from which imported iron and steel are derived only for fiscal years. The latest figures available cover therefore only the period up to June 30, 1887. According to official documents the imports of iron and steel from Sweden, for the fiscal years ending June 30, 1886, and 1887, were as follows:

	1886.	1887.
Iron ore, gross tons	.....	.....
Pig iron, gross tons	1,226	556
Iron scrap, gross tons	101	7,558
Bar iron, net tons	29,326	28,819
Steel ingots, blooms, slabs, and bars, net tons	3,408	4,622
Wire rods, net tons	18,522	25,482

No iron ore is imported from Sweden, and the quantity of pig is light. How, much, if any, crude or manufactured iron and steel originating in Sweden comes to us via England cannot be ascertained, since no statistics are available concerning such transshipment trade in Great Britain. —*Editor.*

The Durango Iron Mountain.

To the Editor: Will you please publish in your next issue your opinion of the so-claimed iron mountain enterprise of Mexico. My reason for making the request is that parties have been selling shares of this enterprise here. Respectfully yours,

BLUFFTON, OHIO. J. P. B.

We have received other communications of a similar kind, and while we cannot undertake to offer any advice concerning investment in this or other enterprises, we may state the following: The magnitude of the deposit of the iron mountain in Durango is beyond a question, and an abundance of cheap and good ore is assured for centuries to come. Fairly good fuel is also accessible, but until lately the development of the local iron industry has been woefully mismanaged, through the disregard of the advice of experienced and reliable iron masters and experts. Lately, however, the practical work at Durango has been put into the hands of T. Witherber, formerly of Port Henry, N. Y., than whom no better furnaceman could have been chosen for so difficult a post.—*Editor.*

Double Refined Bar Iron.

To the Editor: I notice by the new list of extras on bar iron adopted by an Ohio firm, and published in a late issue, that B B double refined bars are quoted at two-tenths extra over bars. I have a keen desire to know just what is meant by double refined. B B, I take it, signifies Best Best. Strictly speaking, a bar made from an old iron rail, reworked, is double refined, but it is hardly what a buyer would expect to receive on an order. I am an old-fashioned iron manufacturer, and what I sell for a double refined iron is a muck bar made from boiled pig iron; this bar cut, repiled, reheated and rolled into practically a finished bar, and sold as single refined; this finished bar recut, repiled, reheated and rolled into a double refined bar. If I am correct in my definition, I would, Yankee like, though foreign born, ask once more, Can any mill, East or West, take a finished bar and roll it into a double refined bar, with the waste both of cropping and in the furnace and the attendant extra handling, at a cost of two-tenths of a cent per pound? I can't; my neighbors say they can't. Won't some of our Western friends give us light on this question.?

INQUIRER.

The Right of Way.

A correspondent who is connected with one of the well-known stove manufactories of the East submits the following question involving points of law:

To the Editor of The Iron Age.—DEAR SIR: I am aware that a person cannot lawfully go on to another's land without his permission; that the owner of land may tear down a building which has been erected thereon without his permission; that he may remove therefrom personal property which is not rightfully there, but do not understand what the rights of parties are in the case of a private road or way in which the public have no right, because they cannot pass over it as they may see fit. Originally A owned the land on both sides of said roadway, also the roadway, and afterward sold to B a parcel of land within a described boundary, and bordering upon said road a short distance, A, by the deed, not parting with the fee in said roadway. Assuming that B, in equity, as against A, has a right to pass upon said roadway to reach his premises, has B a right to treat said road the same as if it was a street belonging to the city? If not, what are his legal rights, if any, in said roadway where it touches his boundary line? An answer to these inquiries may be of interest to many of your readers.

Yours, &c., X.

The answer to our correspondent's question will depend largely on facts which do not appear in his statement of the case. It is a well settled rule of law that if A sells a piece of land to B, a part of a larger tract, the remainder of which he still retains, and if the only possible way for B to reach the highway is over A's land, B has the right to pass over this whether there is a private roadway or not. This is an implied right known in law as an easement, and this particular easement is called a "way of necessity." If it is absolutely necessary for B to reach his land or to leave it that he should pass over A's land, and A is the grantor who sold him the land, then the right exists. This would be true even if there were no roadway, and in the case stated the facts are even stronger than they need be, as the parties may reasonably be deemed to have contracted with reference to the existence of the private road. The fact that A expressly reserved the fee or absolute ownership of the road would make no difference, for one man may own the fee and at the same time another may own an easement, such as a right of way. If the lot sold to B, however, borders partly on the highway and partly on the private road, then there is no right of way of necessity, and under the language of the deed in the case described we think that B would have no right to pass over the private road. It must be remembered that frequently a private road is used for so many years by the public without protest of the owner that a right of way springs up for all the public, by prescription, as it is called. The true owner can then no longer maintain absolute possession of the road. B would, of course, under these circumstances, have all the rights of the public, but only as a member of the public, certainly not through his deed from A. Assuming that the right of passage over a private road exists in a particular case, our correspondent asks whether B has then a right to treat said road the same as if it were a street belonging to the city. We hardly understand the drift of this question. B would certainly have a right to pass over this roadway, not only on foot, but with vehicles, animals, &c. He would have practically all the rights to the roadway which any citizen would want in a city street. He would have the right to compel A to keep the passage clear and unimpeded, or, if A would not, to do himself whatever might be necessary for that purpose. If at any time A desired to close the roadway, it is probable that the law would allow him to do so as against B, provided A furnished another means of egress from B's land. B does not really acquire any title in the roadway itself. He simply has an easement or right to pass over A's land in order to reach his own, which A sold him, not over any particular part of A's land. If A should designate a particular passage, B would be bound to go over that unless he were subjected to unreasonable inconvenience or danger. To sum up the matter, we may say that the rights of B over the roadway would, for most practical purposes, be the same as though it were a public street.—*Editor.*

OBITUARY.

MICHAEL W. WALL.

Michael W. Wall, senior member of William Wall's Sons, the cordage firm, of No. 113 Wall street, and president of the National Cordage Company—the cordage "trust"—died on Sunday morning in Thomasville, Ga., in his forty-ninth year. He had been suffering from Bright's disease since November, although the immediate cause of death was congestion of the lungs. Mr. Wall was born in Williamsburg, of which town his father, William Wall, was mayor before its annexation to Brooklyn. He lived in the Cambridge, at Fifth avenue and Thirty-third street, and had a country place at Newburg. He was a director of the Williamsburg Ferry Company and of two or three banks.

CHARLES T. PIERSON.

Charles Theodore Pierson died at the Fifth Avenue Hotel on Thursday. Mr. Pierson was born in this city about 50 years ago. He was a son of Henry L. Pierson, who was the senior member of the firm of Pierson & Co., well known as iron merchants in this city for nearly 100 years. He was a man of unusual business ability and energy, with marked mechanical talent and taste, and during his life was largely interested in and did much to develop many useful inventions. Chancellor Runyon appointed him receiver of the Grant Locomotive Works, of Paterson, N. J., and he was made a citizen of New Jersey for that purpose; his executive ability and strict integrity were demonstrated by his skillful and successful administration of the complicated affairs of that corporation. The same qualities have been manifested in his management of the affairs of the Ramapo Mfg. Company, the Ramapo Car Works, and other corporations with which he has been officially connected. He had large landed interests in the Ramapo Valley.

A press dispatch from Washington, D. C., under date of the 24th ult., says: The Interstate Commerce Commission today rendered an opinion in favor of the complainants in the case of Riddle, Dean & Co., against the New York, Pennsylvania and Ohio Railroad Company. The complainants in this case charged the railroad companies with refusing to furnish coal cars upon requisition, withdrawal of joint tariff and advancing rates without legal notice. A decision was also rendered in the case of Riddle, Dean & Co., petitioners, against the Baltimore and Ohio Railroad. The commission holds that the charges of unjust discrimination in the matter of cars made against the Baltimore and Ohio Company is not maintained and the petition is dismissed.

When the Western railroad war broke out, the opinion was freely expressed in railroad and general business circles that it would involve some, if not all, of the Eastern trunk lines before it was settled. Indications of this are now making their appearance. It is charged by their competitors that at least two of the trunk lines have been prorating with some of the companies interested in the war of rates between Chicago and the Northwest. Perhaps the introduction of this complication may cause an irresistible pressure to be exerted on the belligerents in favor of peace, thus leading to the settlement of the difficulty very speedily. But if this does not happen, the chances will then be in favor of the most serious railroad war ever seen in this country. For the past week or 10 days there has been a very large increase in the shipments of iron and steel products to Western points from Chicago and its vicinity, induced probably by the belief among shippers that rates were about as low as they could well be expected to go, and that if the 10 day's notice of an advance were suddenly given some trouble might be experienced in getting freight forwarded. Manufacturers of agricultural implements, gasoline stoves and other articles now being distributed among distant agencies in the West to supply the needs of the coming season are profiting handsomely by the war which has come so opportunely for them. The amount saved in the freight on their goods to distributing points will form a very important item in balancing their books at the end of the season.

Petitions are being circulated asking Congress to remove the duty on tin plate. They are receiving many signatures, among them being firms of national reputation in their branch of business, whose names will probably carry great weight in favor of the action prayed for. The hope of the originators of the scheme is to induce the present Congress to put tin plate on the free list before it adjourns. The movement is a formidable one, and it will be necessary for those who are anxious to develop the manufacture of tin plate in this country to get to work very actively if they desire to counteract it. The manufacturers of sheet iron have a very deep interest in this question, apart from their hope of making tin plate, as the abrogation of the duty on tin plate would open the door to the admission of thinly coated sheets duty free, which could be used for a great variety of purposes even if cut and boxed, and would undersell the domestic article.

Mr. B. G. Clarke, president of the Lackawanna Coal and Iron Company, manufacturers of steel rails, at Scranton, Pa., made a visit to Washington last week with the special object of enlightening the Democratic members of the Ways and Means Committee of the House on the facts in regard to the steel rail industry. Mr. Clarke submitted to the committee the identical balance sheets prepared for the past five years for the annual meeting of the board of directors of the company. Taking the average of the past five years, the net profit per ton of steel rails produced was only $2.78.

Rotary steam snow shovels appear to have done good work in clearing Western and Northwestern roads of snow. On the Northern Pacific the switchback over the Stampede Pass was kept clear by the aid of one rotary, a feat which was regarded as impossible in the light of past experience. Many of the Northern Pacific branches in Minnesota and Dakota had been blocked for some weeks before the rotary shovels arrived from the East, but though the snow had been blown hard and was full of sand and dirt and frozen nearly as hard as sandstone the rotary shovels successfully cut their way through, and enabled traffic to be resumed, to the relief of many settlers who were short of fuel and supplies.

The Board of Trade of Kokomo, Ind., closed contracts last week for the location of two factories at that point. One is for the manufacture of glass bottles, fruit jars, &c., and the other is a wood-pulp mill. Other propositions are being considered from manufacturers anxious to avail themselves of the advantages presented of an abundant supply of natural gas, but only the most promising enterprises will be favored.

The Central Traffic Association have announced the following new freight rates: Scrap iron, in carloads, minimum weight 24,000 pounds, from Fort Wayne to Chicago, $1.25 per net ton; rolling-mill cinder, carloads, minimum 12 gross tons, Indianapolis, Ind., to Moxahala, Ohio, $1.45 per gross ton; iron ore, carloads, minimum 12 gross tons, Cleveland to Zanesville, $1.25 per gross ton; scrap iron, carloads, minimum 24,000 pounds, Lafayette, Ind., to Cincinnati, $1.25 per net ton.

At a recent meeting of the Paris Academy of Sciences a paper was read "On the Rapidity with which the Report of Firearms is Propagated," by M. Journée. All the facts there described tend to show that a projectile possessing a greater velocity than that of the report produces, during its passage through the air, a continuous sound analogous to the explosion of gunpowder.

The Sheet Iron and Sheet Steel Manufacturers' Association of the United States held their regular quarterly meeting in the rooms of the Western Iron Association at Pittsburgh, on Thursday, the 23d ult. There was a full attendance, and the regular officers presided. No changes were made in present prices, but the outlook for the year was reported as being very bright, and orders plentiful enough to to keep the mills in steady operation.

A movement is progressing among the friends of Mr. W. H. Wiley, of New York, to advocate his appointment as American Commissioner of the Paris Exhibition of 1889, a post for which he is well qualified, through his wide and accurate knowledge of American engineering and industrial affairs.

The manufacturers of car axles met at Pittsburgh on the 24th and 25th ult., but they were unable to arrive at a satisfactory conclusion, and adjourned to meet at Cleveland on the 28th.

A curious experiment on the effect of magnetism on a rotating disk was recently mentioned by the *Electrician*. A disk of soft iron has a spindle put through it so that it can be spun like a top. When at rest or moving slowly the disk is attracted by the poles of a magnet, but when it turns with sufficient velocity it is repelled by the magnet. The reaction of the induced currents in the mass of the metal is greater than the magnetic attraction.

The coroner's jury in the disaster by which a portion of the elevated road in Brooklyn fell and crushed a horse car load of passengers recently, gave a verdict holding Superintendent Samuel Gardner and Foreman John Schaeffer responsible for the death of the victims, and charges them with negligence in allowing the heavy iron girders to be placed in position without proper bolting. The two men were admitted to bail in $5000 each.

The Gorton & Lidgerwood Company, of New York, were awarded the first class bronze medal for their superior house heating boilers at the recent exhibition of the Massachusetts Charitable Mechanic Association in Boston.

The Dow positive piston pump, which was described and illustrated in *The Iron Age* for April 23, 1887, has been in successful and constant use for about a year. It has, we are informed, fully justified the claims which were made for it. The Kensington Engine Works, Limited, of Philadelphia, are making arrangements for the manufacture and introduction of this pump for all purposes, and also the blower and blowing engine constructed on the same principle.

Coal and Coke in Southwest Virginia.

The extraordinary development of the coal and coke industry of Southwest Virginia is well described in an article contributed by Talcott Williams to the Philadelphia *Press*, who writes from Pocahontas:

Philadelphia owns, operates and controls the mines in this corner of Virginia and West Virginia. They are the last to be developed and their development has been the most rapid in all coal mining history. The three mines which open on the laurel swamp of five years ago, out of which this town rises, have a capacity of 5000 tons a day. One of them has beaten all previous coal mining records by turning out 3717 tons in a single 10 hours. The great seam, 11 feet thick, from which this coal is taken, stretches over 320,000 acres under a single Philadelphia ownership, and of this stretch 60 per cent. is working coal, whose capacity runs at 10,000 tons to the acre. This enormous property is manned, managed and moneyed from Philadelphia, and on it are all the mines yet operated. Beyond it stretch other square miles of the same seam, along which the Norfolk and Western Railroad is extending its Chinch River extension.

The railroad stretches an iron finger here 73 miles long down the New River Valley. The coal field lies like a spreading acanthus leaf with Pocahontas and the railroad at its tip. The crinkly edge of the leaf, deeply indented, will in a way mark the outcrop of this coal along the Bluestone River on one side which is worked, and on the other side along Elkhorn and other streams which is not. The mid rib would stand for the Flat Top Mountain, which gives the region its name. From it run hills like ribs with streams between. Every hill has one seam, No. 3, 11 to 7 feet thick, and most of them two; the second, No. 6, of from 3 to 5 feet. The left half of the leaf is the bigger, and in it is a tract of 13,000 acres owned by S. A. Crozer, of Chester, and J. H. Bramwell, of Bramwell, W. Va. The rest of the leaf is the property of the Flat Top Land Trust, of which E. W. Clark, Sindey F. Tyler and H. M. Bell are trustees and Clarence M. Clark is secretary and treasurer and Mr. C. H. Duhring manager on the ground. Two companies began here, the Southwest Virginia Improvement Company, of which Colonel George Dodds is now superintendent, H. Wickham, president and E. J. Collins, secretary, and the Flat Top Mountain Coal Company. The first owned the tip of the leaf in Virginia. The other owned all the rest of its right side; but as West Virginia has a law prohibiting any company from owning over 10,000 acres, a little swarm of between companies were organized to hold the land in blocks. These with the central company had a capital of $600,000, and owned 80,000 acres of coal lands. April 1, 1887, the Flat Top Land Trust was organized. It bought out the lands of the Southwest Virginia Improvement Company and of the Flat Top Mountain group, as well as the other side of the leaf, 250,000 acres more. The owners of the Southwest Virginia Company and the rest received "trust" certificates for their land, and one of the companies, now owned by the "Trust," the Blue Stone Coal Company, leases its mines to operators on a royalty. It has taken six years or so to pass from the purchase of lands at $1.50 an acre and upward to a "Trust" with intermediate corporations and operators mining the coal on a royalty system. The coal is sold by still another company, the Pocahontas Coal Company, of which W. C. Bullitt is president, D. H. Matson, secretary and W. W. Curran, treasurer. This company, the ownership of whose stock is not published, takes all the coal mined, guarantees 85 cents a ton, drives the only bargain for freight now made with the Norfolk and Western, and sells the coal. The Norfolk and Western represents the coal field in the Seaboard Bituminous Association or "pool," and the coke producers at the mines have made a pool of their own, contracting to deliver their coke at $1.85 a ton to Hull & Co., of Louisville.

The coal measure, of which this well organized field is a part, is the same as that which is mined on the Chesapeake and Ohio, along the New River at Quinimont and elsewhere. It is a great sheet of coal lying under the untrodden wilderness of Southwest Virginia and Southern West Virginia, which has been opened at these two points and is certain to be opened at many more. Geologically it is at the bottom of the great coal column, and probably occupies the same place as the Kittaning coal measure.

Directly opposite statements are made in regard to the undeveloped share of this coal field on the Chinch Valley extension of the Norfolk and Western, where the tunnels run through coal, and the contractors are using it for their dumps, as well as on the South Atlantic and Ohio, a new road 150 miles west. However this may be, this coal field has only just been tapped, and the mines now open are run only from 180 to 190 days in the year, in part from the self-imposed restrictions of the seaboard pool and in part from lack of cars. If the magnetite and other iron ores in Southwest Virginia prove to be all that is asserted and expected of them no coke field in the country of equal excellence is so near iron ores. In any case, the coke will go West to meet the Michigan ores and the coal East to the seaboard. This has already begun, and the growth of the field in these two directions is apparent in this statement of output, which gives in addition the names of all the operators—quantities in long tons.

Coal and Coke Products of Flat-Top Lands.

Operator	1887. Coal.	1887. Coke.	Total from opening. Coal.	Total from opening. Coke.
Southwestern Va. Imp. Co.	550,709	93,295	1,632,288	264,428
Jno. Cooper & Co.	102,317	....	249,742	.....
Freeman & Jones.	121,084	11,735	272,188	11,735
Wm. Booth & Co.	110,570	9,203	213,575	9,203
Mill Creek Coal & Iron Co.	63,527	15,841	85,332	15,841
Stephenson, Mullin & Co.	....	6,775	88,713	6,908
Robert Goodwill & Co.	9,008	....	9,008	....
Total.	1,026,143	136,432	2,547,616	308,171

These figures are important less for what they are now than for what they predict. The two Virginias in 1880 produced 1,500,000 short tons of coal, of which 100,000 were from Virginia; in 1884 they produced 3,450,000, of which 250,000 tons were from the larger State, and in 1887 the product reported and estimated rose to 5,200,000 tons, of which considerably over a tenth were from this State. The mines of the recently developed coal fields of this section, here and on the Chesapeake and Ohio, three years ago were playing an inconsiderable part among the bituminous coals east of the Alleghenies. Last year the seaboard percentage allotted these two lines was 21 per cent. and it is likely to reach a full fourth in 1888, for while the Chesapeake and Ohio output fell off, from 656,760 in 1885 to 510,301 in 1887, the mines here advanced 44 per cent. of their output. These mines had their first great opportunity during the Clearfield strike in 1886, and they gained a position which they are likely to maintain in spite of the great distance their product must be taken. Half their shipments reach the seaboard at Norfolk before they find a purchaser, and the minimum price of coal at tide-water under the pool is $2.60, against 85 cents paid here at the mines. This is equally true of coke shipments, which reached 8603 cars in 1887; only 5987 of them went to points on the Norfolk and Western and Shenandoah Valley, to be consumed at Lynchburg, Roanoke and points still more distant. The South took 1275 cars, for in Alabama the building of furnaces has outstripped the construction of coke ovens, and the coke produced is far from equaling that made here. Chicago, East St. Louis and other points in Illinois took 1263 cars, and the real future of this district will only begin when it has a direct Western connection, already surveyed, an opening to the Southeast to Wilmington, and, lastly, furnaces in its immediate neighborhood. Meanwhile, 1888 promises very considerably to increase over 1887, the output of the mines here being 81,000 tons for January, against 41,000 in January of last year.

The significant product of this region is, however, not its coal, but its coke. Coal is everywhere, coke is rare. Connellsville, Pa., has as near a monopoly of the best coke as exists in any fuel. Into the vexed question whether this coke is in all respects equal to Connellsville I shall not enter. What is conceded is that this, with 92 per cent. of fixed carbon, has a higher percentage of carbon and a lower one of sulphur. I find that the operators do not find it necessary to make the nominal allowance of 1.6 tons of coal to a ton of coke. This is an advance over earlier figures; but a like improvement has taken place in Pennsylvania, where the yield was 65.2 in 1886, as compared with 64.6 in 1885 and 62 in 1884, the last probably an error. The rapid advance in the production of coke here is apparent from the following table, whose first figures are those of Mr. Weeks for 1884:

	1884.	1887.
Establishments	1	5
Ovens built	300	639
Ovens building	0	900
Coke, short tons	63,600	152,805
Value of ovens	$111,300	$245,576
Value coke per ton	$1.75	$1.65@$1.85
Yield of coal in coke	64½	65

Large as is this advance it is scarcely more than on a scale with the advance of this industry in the entire country. The cost of production in a level seam of this thickness is low, far below the general level, which in 1880 was $1.22 per ton for bituminous coal and $1.39 for coke. The production per miner is not apparently as great here as in Connellsville. The average in the Pocahontas mines would not run over four wagons per man, and where in the narrower seam on the Bluestone River a man and a boy, or laborer, generally work together, the average is about the same for both. Here, as in Connellsville, there is no waste and no slate, and while a floor and roof of coal are left above and below a large part of this is saved when the supports are removed. The cost of handling the coal is at its lowest possible figure. Donkey engines bring the cars out of the mine. Aside from the labor account, the expenses of operation are not heavy. Timber as yet is abundant and close at hand and the timbering is less expensive than in Northern mines. The expense per ton of timbering and track laying falls as low, under favorable circumstances, as 1¼ cents a ton, and it rises to 2½ and 3 cents per ton for each of these items in smaller mines or where the seam is in a less advantageous situation. A graded royalty is paid by operators to the "trust" of 12½ cents per ton for the first 10,000 tons mined, 11 cents above that to 25,000 tons, and over this output of 10 cents. The cost of coal at the pit mouth is placed at 65 cents, but it may fall as low as 60 cents, but the first figure is generally taken as the safest basis of calculation. The cost of making coke, coal and all, is placed at $1.35 per ton.

Of the coke made at Pocahontas all but the Sunday drawing is 42-hour coke—that is, 72-hour, and this is the normal practice.

If the mines ran on full time this would be a Paradise for miners. The company open the ways and chamber, timber and lay the tracks, bring the cars up to the breast and take them away and pay 75 cents a car for 2-ton cars, holding from 80 to 85 cubic feet. The miner provides oil and powder and pays 50 cents a month for tools. "It is a poor man," said Mr. William Moody, the mine boss, "who connot make his four cars a day, and a good man makes five." Colonel Dodds speaks of negro miners who make $120 and $130 a month, nor from the number of men coming out with five cars as their day's work does this seem surprising. The net sum received for a car varies from 50 to 60 cents and Colonel Dodds placed the average wages at $45 a month. The boy drivers receive 90 cents to $1.06 a day; timber and trackmen $1.85 to $2.20; men on the dumps $1.40 and laborers, from $1.40 to $1.27: Coke drawers receive from 53 to 55 cents an oven. It would be a great error to imagine that this field has cheap labor, as compared with Northern fields, or that the magic of high wages will not make an efficient miner out of a negro.

Australian Copper Mines.

In an article on copper mining, the *South Australian* gives the following data:

The great Moonta Mine was discovered in 1861 by a shepherd named Ryan. Within 16 years this wonderful property had yielded so much wealth that over £1,000,000 had been distributed among the shareholders. It was the first mine in Australia which paid dividends to this enormous amount. The continued low price of copper since that time has rendered great profits an impossibility, and consequently during the last ten years shareholders have received but very little return on the money invested in the mine. Up to the end of August, 1877, 298,000 tons of ore had been raised from the mine, averaging 20 per cent. of copper, and the amount realized on it was £3,240,000. The cost of raising the mineral was £2,083,000, and the amount paid in dividends to that date was £1,012,000. Ten years later—that is, to August 31 of last year—the total quantity of dressed ore raised amounted to 499,657 tons. The cost of raising this was £3,457,229, and the receipts amounted to £4,707,697. The amount which has been paid in dividends is £1,072,000, so that within the last ten years only £60,000 has been distributed among the shareholders. Ever since the mine started it has given employment to a large number of men, and if the present high values remain there is no doubt that the mine will before long be as busy as ever. Twelve months after operations commenced there were 263 men employed. From that time the number has steadily increased, and three years later there were 1075 persons working for the company. A slight decrease in the number then took place, and for a succeeding period of three years the number employed was under 1000. In 1869 the number had increased to 1100. During the following years the number grew steadily, and in 1877 there were 1687 men and boys working on the mine. This is the largest number ever employed there. Since then the average number has been 1250, and for the last two years it has been below that average. On August 31 the total number of persons, all told, employed by the company was 966. As may be expected, there is a large quantity of valuable machinery on the mine. At the last valuation the machinery, pitwork, buildings and improvements were put down at £169,316.

Some idea can be formed of the amount of work which has been done on this mine by a consideration of the figures showing the extent of the excavations. Taylor's shaft, which is the deepest on the mine, is down 265 fathoms, or nearly one-third of a mile. The aggregate length of driving at the various levels equals about 28 miles, and the total length of the shafts, drives and winzes is 40 miles. These figures, dealing with our greatest mine, will show what our copper mining industry has been in the past, and give some idea of what a continuance of the present high rates means to this colony. But there are copper mines in the colony which have been stopped owing to the unpayable market which will be reopened, while no doubt discoveries will be made of other mines. Among other signs of activity in mining circles, the latest is a movement on foot to work the Wheal Hughes Copper Mine again. It is 22 years since it was started, and at one time it was in a flourishing state, paying dividends of 10 shillings per share a fortnight. After being worked for several years with success it had to be abondoned, owing to the low price of copper. There are several shafts, some as deep as 50 fathoms. The whole mine comprises 300 acres.

English Steel Projectiles.

According to the London *Engineer*, a successful trial has recently taken place of a forged steel projectile made in the Royal Laboratory, on a patent of Mr. R. Low, the manager.

We are not, says our contemporary, in possession of the recorded velocities of the two shells that were fired, but we believe that the following facts are approximately correct: Projectile, diameter, 4 inches, weight, 25 pounds; firing charge, 12 pounds; velocity, nearly 1900 feet; energy, about 600-foot tons. Each of the two in turn passed completely through a 5-inch steel-faced plate and 12 inches of backing, entering some depth into a wrought-iron plate behind it. The recovered projectiles, which we have seen, are set up to the extent of about 0.5 inch in length, and are very slightly enlarged; but the points are perfect, and the shells are practically unaffected, and capable of repeated use. When it is remembered to what a high standard the manufacture of steel plates on this scale has been brought, the remarkable measure of success of this shell will be recognized. The process of manufacture is as follows: The projectile is forged and turned, brought to a red heat, and then placed point down in a metal mold, such as would be used in chilling. Into this it is pressed by gradually increasing hydraulic power. Fractured projectiles thus made show the hardening effect extending to the center of the head. Mr. Low argues that his process commences on the shell the action which is to be more violently continued on impact. When hot the shell is subjected to a statical pressure resembling the dynamical forces acting on it after its head enters the shield.

Since the receipt of our report of the status of affairs between the Edgar Thomson Works and their employees, printed under "Manufacturing Notes," another conference has been held between the firm and their employees, with the result that every department of these immense works has been closed down, and what promises to be a long and bitter strike has been commenced. Furnaces F and G have also been banked down, making seven idle blast furnaces at the above plant. The men have been notified that they have been discharged from the employ of Carnegie Bros. & Co., and to call at the office of the firm and get the money due them. From present appearances it is evident that the firm will not make any concessions to the men, and that when operations are resumed it must be at a reduction of 10 per cent. in wages. It is stated that a meeting of the employees will be held in a few days, when a more favorable proposition will be submitted to the firm for a resumption of work.

It is said that the force of men formerly employed in handling coal at Port Richmond, the great shipping port, have been displaced by the introduction of machinery. At the same time the capacity of the coal yards is doubled. Formerly it was the custom to employ men with wheelbarrows to wheel the coal from the dump to a pile, the utmost capacity of which was 25,000 tons. Now, by the aid of iron scoops running on an endless chain, the capacity of the pile can be increased to 75,000 tons, besides dispensing with the labor. This chain of scoops is attached to a pole 90 feet in hight, and is so made as to pile the coal to an altitude of 84 feet. Along the piers are similar arrangements for piling coal and loading cars from the dumps, and they work very satisfactorily.

With the rapid rise in the price of copper it is probable that the men will demand and obtain higher wages, and that this circumstance will make the resumption of work by old abandoned mines a matter of some difficulty.

Our Pittsburgh correspondent telegraphs us as follows: "John Semple, Jr., who was appointed umpire in the wages dispute between the Pittsburgh Tube Company and their employees, has decided that there shall be no reduction of wages. The company demanded a reduction of from 10 to 16 per cent., which the men refused. Then it was agreed to decide the matter by arbitration. A similar reduction had been requested by all other tube manufacturers in Pittsburgh, excepting the Pennsylvania Tube Works. It is thought that this decision will have great influence in settling disputes at the other works, but the manufacturers claim that they cannot pay present wages, in view of the low prices of their manufactures at present, and that they will continue to allow their mills to remain idle until there is an improvement in prices. It is estimated that there are about 5000 employees of the different works here and at McKeesport idle at present."

During the recent excavations in the Strand, London, England, for the purpose of laying the Hydraulic Power Company's mains, about 40 feet of old wooden water-pipe was unearthed. It would seem that they date from the introduction of the New River water during the reign of King James I. The pipes laid down for the conveyance of the New River water are said to have passed through the streets to the extent of 400 miles. The pipes were formed of small elm trees, drilled through the center, and cut into lengths of about 6 feet, one end being tapered to fit into the one laid before it. These pipes are said to have leaked and burst during the frost; but the writer of an article in the "Book of Days," volume 2, page 393, apparently in 1864, says: "Cast-iron pipes have now entirely superseded them, but this is only within the last 25 years, and it may be worth noting here the curious fact that the rude elm tree water-pipes were taken up and removed from before the houses in Piccadilly, extending from the Duke of Devonshire's to Clarges street, so recently as the year before last, and that a similar series were exhumed from Pall Mall about five years ago."

TRADE REPORT.

British Iron and Metal Markets.

[*Special Cable Dispatch to The Iron Age.*]

LONDON, WEDNESDAY, February 29, 1888.

There have been a quite fair number of inquiries from the American and the Canadian markets for Scotch Pig. As yet, however, these do not appear to have led to business of any magnitude. Other export demand has been rather slow, and purchases by home consumers are merely of ordinary volume. Production continues to be on a large scale, and stocks in store steadily increase. Prices are a shade lower on some brands. Middlesboro' Pig has been in good demand. Some makers are well sold ahead, and prices remain very steady, except among outside holders, who have sold more freely. The production of Hematite Pig continues large, and new orders run rather light. Values are fairly maintained, but there is some talk of a probable reduction of the output, in order to prevent serious accumulations. The strike in the Cumberland district has terminated.

The Rochsoloch Iron Works, Glasgow, have been reopened, and will produce unbranded iron

New orders for Steel products have not been very numerous latterly, but the mills are fairly well engaged on old contracts. It is stated, however, that there are a good many inquiries for Blooms and Billets for American account. The Yorkshire makers are increasing their output and competition has sharpened sufficiently to weaken prices on Rails, Billets and Slabs. Orders previously in negotiation, representing a total value of about £100,000, have been closed for Railway Material at the lower prices.

The Tin-Plate makers fail as yet to agree upon a satisfactory plan for reducing the output. It is now stated that all makers favor a reduction. There are several distinct propositions that are well thought of by different interests, but no particular one meets with general favor. The output therefore continues to be excessive and values are therefore still devoid of firmness. Business has been slow during the week and prices are still unsettled.

The Copper market has been influenced in some degree by renewed reports of threatened interference at the Rio Tinto works by the Spanish Government. The authorities assert that the calcining process is destroying vegetation to a great extent, and affecting the health of the people. Such pressure is brought to bear that it is thought probable that the supply from those mines will be curtailed fully two-thirds. Speculation has been rather more active the past week, but the supposed representatives of the syndicate figure most prominently as buyers. Supplies continue to be somewhat in excess of the deliveries and it is estimated that a further increase in stocks will be shown for the last half of the month. There is now in stock at Liverpool about 1600 tons Anaconda matte. The owners hold for 15/3 per unit for 60 %. The last reported sales were at 15/ per unit.

No new feature has developed in the Pig Tin market, and prices are still governed almost wholly by the "ring." Lead has been more active and is decidedly firmer. A livelier demand is also reported for Spelter.

Scotch Pig.—Trade has been slow, and prices are unsettled, with a weak undertone to the market.

No 1 Coltness,	f.o.b.	Glasgow,	49/
No. 1 Summerlee,	"	"	49/
No. 1 Gartsherrie,	"	"	46/
No. 1 Langloan,	"	"	47/
No. 1 Carnbroe,	"	"	41/6
No. 1 Shotts,	"	at Leith	41/6
No 1 Glengarnock	"	Ardrossan	45/
No 1 Dalmellington,	"	"	41/
No. 1 Eglinton	"	"	40/

Steamer freights, Glasgow to New York, 6/; Liverpool to New York, 7/6.

Cleveland Pig.—The business moderate in volume, but prices steady. No. 1 Middlesboro', G. M. B., 34/; No. 3 do., 31/6.

Bessemer Pig.—The market steady, with demand fair. West Coast brands, mixed numbers, 43/ @ 43/6, f.o.b.

Spiegeleisen.—Only moderate sales, but prices steady. English 20 % quoted at 75/, f.o.b.

Steel Rails.—Large sales have been made at irregular prices. Standard sections quoted at £3.18/6 @ £4, f.o.b.

Steel Blooms.—There has been more business, and prices have remained steady. We quote at 72/6 @ 75/, f.o.b., for 7 x 7.

Steel Billets.—A very fair business at lower prices. Bessemer 2½ x 2½ inch £3.18/6, f.o.b. at works.

Steel Slabs.—Business slow and prices unsettled. Bessemer, £3. 17/6, f.o.b. at works.

Steel Wire Rods.—Demand still moderate, but prices steady. Mild Steel No. 6 quoted at £5. 18/6, f.o.b.

Old Rails.—Sellers very firm, but trade is moderate. Tees quoted at £3, and Double Heads £3. 2/6 @ 3/5, c.i.f., New York.

Scrap Iron.—Demand moderate and prices nominal. Heavy Wrought at 47/6 @ 50/, f.o.b.

Crop Ends.—Business slow but prices held steady. Bessemer quoted £2. 5/ @ £2. 7/6, f.o.b.

Tin Plate.—The market still weak and sales slow. We quote, f.o.b. Liverpool:

IC Charcoal, Allaway grade	16/3 @ 16/6
IC Bessemer steel, Coke finish	14/3 @ 14/6
IC Siemens " " "	14/6 @ 14/9
IC Coke, B. V. grade	14/3 @ 14/6
Charcoal, Terne, Dean grade	13/6 @ 13/9

Manufactured Iron.—The market generally is quieter, but prices remain steady. We quote, f.o.b. Liverpool:

	£	s.	d.		£	s.	d.
Staff. Ord. Marked Bars	7	10	0	@			
" Common "	5	2	6	@	5	5	0
" Bl'k Sheet, singles	6	15	0	@	6	17	6
Welsh Bars (at Wales)	4	12	6	@	4	15	0

Tin.—Firm market but sales moderate. Straits closed at £166 @ £167. 5/, spot, and £143, three months' futures.

Copper.—The market firm, but rather quiet. Chili Bars closed at £78. 17/6 @ £79. Best Selected, £79. 10/6.

Lead.—The demand more active and the market stronger. Soft Spanish, £14. 17/6 @ £15 at the close.

Spelter.—Market firm and the demand good. Silesian, ordinary, £19. 7/6 @ £19. 10/ at the close.

Financial.

OFFICE OF THE IRON AGE,
WEDNESDAY EVENING, February 29, 1888.

There is much of obscurity in the business outlook, along with much that is cheering. Railroad freight wars, a formidable strike of railroad engineers on the Chicago, Burlington and Quincy line, with its branches, comprising 2500 miles, and which ramify half a dozen States; disclosures respecting trusts and syndicates, the delay of Congress with reference to important questions and the possibility of a European war, all have an unsettling effect. The position therefore is one of hesitancy. The dullness usual at this season is perhaps more than usually noticeable in most branches of business. The dry goods jobbing trade is a special exception, buyers from the interior being numerous, with a large amount of business in sight, surpassing that of last year for the corresponding date. Despite adverse circumstances the volume of trade, taking the country as a whole, is in good proportions, as shown by the Clearing House exchanges. In New York City there is a reported decrease of 8.8 % compared with the same week last year, which dullness on the Stock Exchange satisfactorily explains, but outside of New York the increase is 2.7 %. Pittsburgh, Chicago, St. Louis, San Francisco and nearly all points in the Northwest show substantial gains.

The Stock Exchange markets were generally dull but strong until to-day, when nearly all declined, including some of the most active. The source of weakness was ascribed to the delay of Congress in providing for the Treasury surplus. Higher prices at the beginning followed the adjustment of the strike in the Schuylkill regions, the coal shares, St. Paul and Gould stocks leading. On Monday the reported lower prices in London for Americans, and the announcement of the strike of engineers on the Chicago, Burlington and Quincy, made the market heavy in the early trade, from which there was a partial rally, which became more pronounced on Tuesday. To-day the advance was lost.

United States bonds were steady, close as follows:

U. S. 4½s, 1891, coupon	107½	@	108
U. S. 4s, 1907, coupon	125¼	@	125¾
U. S. Currency 6s, 1895	120	@	..
U. S. Currency 6s, 1897	122	@	....
U. S. Currency 6s, 1897	124	@	....
U. S. Currency 6s, 1898	126	@	....
U. S. Currency 6s, 1899	128	@	....

Railroad bonds were fairly active and irregular.

The weekly bank statement was more unfavorable than anticipated, the absorption of funds by the Treasury having caused the loss of about $3,000,000 to the banks, thus offsetting all gains from the interior. These changes caused a decrease of $2,736,950 in surplus reserve, which item now stands at $15,200,425, compared with $11,393,000 this time last year. The steady decrease of the surplus for several weeks past, considered in connection with the probability of gold exports before long, is suggestive of more active money at higher rates, especially in case of political disturbance in Europe. The recent sharp advance in foreign exchange serves to strengthen surmises of this character and excites more interest as to the disposition of the surplus. In the Senate, on Tuesday, the Finance Committee rendered a favorable report on Mr. Sherman's bill directing the Secretary of the Treasury to invest not exceeding 80 % of customs funds at his control in the purchase of bonds. The market for sterling was quiet, but firm, as few commercial bills are offering. Posted rates are $4.86 @ $4.88. Bankers are inclined to think that exports of gold are not improbable, but opinions differ much respecting the time of their commencement. The bids for $3,000,000 3 % New York City

water loan bonds aggregated $7,389,000. The awards were: Bowery Savings Bank, $1,000,000 at 102½; Moller & Co., $1,775,000 from 101⅛ to 102½; Harriott & Groesbeck, $50,000 at 101.78 and $50,000 at 101.65; Pacific Fire Insurance Company, $25,000 at 101.56, and Atlantic Trust Company, $100,000 at 101.15. According to the Custom House report the exports of specie from this port during the week were $738,000 and the imports $223,900, making the totals since January 1 respectively $4,204,000 and $1,001,000, against $4,303,000 and $3,537,000 for the same time in 1887.

In the general market a tendency to lower prices is more noticeable for the leading staples. Accounts respecting trade in the interior are favorable, advantage having been taken of low freight rates to push the distribution of merchandise and produce, and the same influence accounts for the presence of many Western merchants in Eastern cities. Exporters continue to take a fair amount of wheat, and for the United Kingdom chiefly, with some corn, but flour is not wanted. The provision movement is very light, but prices are fairly held. Cotton is $\frac{1}{16}$¢ lower. The sugar market is strong in tone and quotably higher. Coffee is unsettled by increasing supplies. India rubber firm. Tobacco firm. It is remarked that, as a rule, the staple commodities are in a strong position, statistically considered, the surplus reserve of wheat, pork, cotton &c., being largely reduced compared with last year. The wool clip, on the other hand, is larger than ever before.

The importations of merchandise at this port during the week were valued at $10,297,000, of which $3,900,000 represents dry goods. Since January 1 the total is $75,901,000, as compared with $71,067,000 for the same time last year and $67,880,000 in 1886. The exports for the week amounted to $6,451,232, making the total since January 1 $47,742,000, against $44,543,000 for the corresponding period last year, and $50,748,000 in 1886. The items include 554,000 bushels of wheat, 2151 bales of cotton and 6,555,000 gallons of oil.

The articles of association of the Fourteenth Street Bank were filed in the County Clerk's office. The stockholders are principally large retail dry goods men. The new Assistant-Treasurer at New-York, Judge McCue, takes his position on Thursday.

The reported failures for the week number 270, as compared with 209 for the corresponding week last year. George H. Clarke & Co., hat jobbers, of New York, suspended, with liabilities estimated at $200,000.

The New York, Lake Erie and Western Railroad maintain under their turntable at Dunkirk, N. Y., a coal stove which in a fire is kept, to prevent the turning machinery from coating with ice, as the water drops down there from locomotives while being turned. A funnel projects about a foot through the platform of the table, betraying the presence of a fire in the lower regions.

The policy of converting compound engines to tri-compound is being steadily pursued by some of the English steamship companies. The results have thus far in all cases been highly satisfactory.

In a lecture on "Lighthouse Illuminants," recently delivered before the Belfast (Ireland) Natural History and Philosophical Society, Mr. John R. Wigham exhibited a new method of illuminating lighthouses, which he called a fourth illuminant. This plan consists in supplying air under pressure to lighthouse lamps, so as to surround the flame with a cylinder of air and do away with chimney glasses, and thus avoid a serious element of expense and danger.

NEW YORK.

American Pig.—The market here is quiet, with only a very moderate demand, and little offering in the way of best Foundry grades, while off-grade Irons are more eagerly seeking purchasers. Negotiations for some fairly round blocks are pending. The Thomas Iron Company have not yet decided what prices to fix, Mr. B. G. Clarke stating that a decision will not be announced in the next few days. The other Lehigh makers are not offering any Iron to speak of, while the agents of Southern Irons are filling contracts entered into previously, and only some Pig from second hands is available. The new South Pittsburgh furnace is expected to blow in at an early date. We quote good to choice No. 1 Foundry in moderate blocks at $20.50 @ $21.50, the same range of No. 2 Foundry, $19 @ $20; Cinder Mixture down to $18, and Gray Forge, according to quality, $16 @ $16.75 at tidewater.

Spiegeleisen.—The market continues extremely dull. All of the Eastern Rail mills are apparently well supplied for some time to come from last year's purchases, and at least one of them is offering stock for sale at $26.50 @ $27 for 20 %. The Western Rail mills have been idle so much of the time and have as yet sold so small a part of their capacity for 1888 that there is no demand from that quarter. On the other hand, Spiegeleisen abroad has been in good request, and has been firm for some time past on account of the good employment of the English and Continental Steel mills.

Scotch Pig.—The market is dull, at $20.75 @ $21 for Coltness, $19.50 @ $19.75 for Dalmellington, $20.50 @ $21 for Summerlee, $19 @ $19.50 for Eglinton, $20.25 @ $20.50 for Glengarnock, and $19.50 @ $20 for Clyde. Shotts has sold at a low figure ex-ship.

Bar Iron.—We quote in carload lots on dock, 1.75¢ @ 1.80¢ for Common; 1.80¢ @ 1.90¢ for Medium, and 1.90¢ @ 1.95¢ for Refined, with half extras.

Structural Iron.—A few mills complain of the scarcity of new orders for Structural Material. We quote Bridge Plates at 2.10¢ @ 2.20¢; Angles, 2.25¢ @ 2.40¢, and Tees 2.75¢ @ 2.90¢ in round lots on dock, and Beams and Channels at 3.3¢.

Plates.—Plates are weak. We quote Iron Tank, 2.1¢ @ 2.25¢; Shell, 2.4¢ @ 2.5¢; and Steel Plates, 2.4¢ @ 2.7¢ for Tank, 2.75¢ @ 2.95¢ for Shell, 3¢ @ 3.25¢ for Flange, and 3¼¢ @ 4¼¢ for Fire-Box.

Steel Rails.—In a quiet way considerable business is being done. We note sales aggregating about 33,000 tons, of which about one-third is for the East, two small lots for the South and the balance West, the two former being secured by Eastern mills. There are rumors also of a sale by a Chicago mill of 27,000 tons to a Northwestern road. The situation is somewhat mixed. The Eastern mills are well supplied with orders for the immediate future—a fact due to the circumstance that practically every important trunk line has placed its orders, while the New England market is supplied, with the exception of isolated contracts. In the West the railroads have purchased sparingly, and the great plants of that section are very indifferently supplied with work. It is reported that some of them are displaying some uneasiness, and that they are decidedly adverse to any increase in the allotment, for which some of the Eastern mills have asked. One of the latter has even applied for the granting of a 10,000-ton lot from the reserve allotment in the hands of the Board of Control. Relatively prices in the West are considerably lower than those at Eastern mills. With Rails at $33.75 @ $34, at Chicago, and freights of Eastern Pennsylvania mills ranging between $4 and $4.50, sales of the latter in the West net less than $30, while the nominal quotation remains $31.50 @ $32.

Billets.—Some negotiations are pending for foreign Steel Billets, for which importers quote $29.50 @ $30.

Wire Rods.—There has been a little more inquiry, but we do not hear that any business of consequence has been closed. Some tons of Rods in store here are being offered by importers at a concession from the price which would be equivalent to the foreign quotation. We quote $41 @ $41.50.

Old Rails.—The market is dull at $21.75 @ $22 for T's, while Double Heads are nominally $23.

Philadelphia.

Office of *The Iron Age*, 220 South Fourth St., PHILADELPHIA, PA., February 28, 1888.

Pig Iron.—Developments during the past week have not been specially favorable to the Iron trade, and things are about as dull and draggy as at any time for months past. Prices are not quotably lower, but the feeling is weak, and indicates a lower range before any large amount of business can be done. Furnaces in this vicinity are not working up to their normal capacity, but, in spite of that, there is plenty of Iron for the time being, perhaps a small surplus. In any case, there are more sellers than buyers, and from present appearances this disproportion is likely to continue until prices reach a point that will cause a material curtailment in the output. There seems to be very little reason for expecting much increase in consumption; there may be some increase during the next 60 or 90 days, but the number of new furnaces South and West preparing to offer their product (besides others near at hand) is likely to offset any improvement of that kind. Prospects, therefore, are anything but bright, and if prices can be maintained at something not far from to-day's quotations it is about all that can be hoped for. However, it is claimed by some well-informed parties in the trade that there is a vast amount of business waiting for lower prices, and that that fact of itself will be sufficient to hold the market steady. Many large orders were held back because of the strike, and if not placed now in large lots the continuous demand for smaller quantities will practically amount to the same thing. It is not at all unlikely that such will be the case, but, in the meantime, there is no doubt that the market is dull, weak and irregular at about the following prices, tidewater deliveries: No. 1 Foundry, $20.50 @ $21; No. 2 ditto, $19; Gray Forge, $17 @ $17.50. Some few special brands command a trifle more, but in ordinary cases the rates named are fair average prices.

Foreign Iron.—Business is extremely dull, and although agents are soliciting bids, they are hard to get at anything near the prices asked, which are about as follows: Bessemer at about $20, c.i.f., duty paid, 20 %; Spiegel at $27.50 @ $28.

Blooms.—A moderate amount of business is being done in Steel Blooms (domestic), but there is an unsettled feeling, and a disposition to take as little as possible for the present. Asking prices about as follows: Foreign, $30 @ $31 for Nail Slabs; $31.50 @ $32.50 for 4 x 4 Billets, and $35 @ $39 for Siemens-Martin, price according to analysis, &c. Domestic Blooms: Steel, from $30 to $35, f.o.b. cars at mill, according to analysis; Charcoal Blooms, $53 @ $54; Run-out Anthracite, $45 @ $46; Scrap Blooms, $38 @ $39 ₱ "bloom" ton.

Muck Bars.—Very quiet, indeed, although there are sellers at prices varying

from $29.50 to $30.50 at mill, according to quality, point of delivery, &c.

Bar Iron.—Business in this department is very disappointing. Some of the mills manage to run tolerably full, but the majority are not more than from one-half to two-thirds employed, and this leads to severe cutting of prices. Consumption is large, but the offerings from the West are so large, and at such low figures, as to almost preclude the possibility of anything being done here at a profit. A better condition of affairs is hoped for, however, and in the meantime manufacturers are disposed to stand firm at 1.9¢ @ 1.95¢ for best Refined Iron, although on large orders some of the country mills have offered to shade the inside quotation. Skelp Iron appears to be entirely neglected, and the loss of this class of trade is a serious misfortune to a great many mills. There are no inquiries in the market at present, although 1.9¢ would be readily accepted for Grooved and 2.15¢ @ 2.2¢ for Sheared.

Plate and Tank Iron.—Business is extremely quiet in this line. There is an occasional good-sized order in the market, but as a rule only small lots are called for, and as there are so many competitors, prices are kept at very unremunerative figures. At the moment there is nothing in sight to indicate any special improvement, except that the spring trade is usually larger than during the winter months, while at a later date the chances seem to be favorable for quite a heavy demand. For the present, however, things could hardly be duller than they are, sales being chiefly in small lots at about the following quotations: Ordinary Plate, 2.10¢ @ 2.15¢; Tank, 2.15¢ @ 2.20¢; Shell, 2.5¢ @ 2.6¢; Flange, 3.5¢; Fire-Box, 4¢; Steel Plates, Tank and Ship Plate, 2.4¢ @ 2.5¢; Shell, 2.8¢; Flange, 3¢ @ 3¼¢; Fire-Box, 3¼¢ @ 4¼¢.

Structural Iron.—There is a fair demand for small lots, but beyond that there is very little inquiry at present, although there are a great many things in sight which promise a heavy consumption during the summer and later months. Some of the leading mills are still busy on old orders, but there is no difficulty in securing prompt delivery for almost anything that may be called for. Prices are unchanged, and may be quoted about as follows: 2.15¢ @ 2.25¢ for Bridge Plate; 2.25¢ @ 2.35¢ for Angles; 2.8¢ @ 2.9¢ for Tees, and 3.3¢ for Beams and Channels, Iron or Steel.

Sheet Iron.—There is a moderately good demand, considering the season of the year, and mills are kept actively employed without accumulating a great deal of stock. Prices are steady at about the following quotations for small lots:

Best Refined, Nos. 26, 27 and 28	3½¢
Best Refined, Nos. 18 to 25	3¼¢
Common, ¼¢ less than the above	
Best Bloom Sheets, Nos. 26 to 28	4½ @ 4¾¢
Best Bloom Sheets, Nos. 22 to 25	4 @ 4¼¢
Best Bloom Sheets, Nos. 16 to 21	3½ @ 3¾¢
Blue Annealed	2.8 @ 3 ¢
Best Bloom, Galvanized, discount	60 %
Common, discount	65 %

Steel Rails.—The market has not developed as much activity as was expected, and although some of the mills are very anxious for business, prices are firmly maintained, with $31.50, at mill, as the bottom price for the most desirable class of orders. Smaller lots bring $32 @ $32.50, and a good portion of the demand is of that character. A much heavier business is supposed to be near at hand, but in the meantime there seems to be so many things to cause delays that it might be a little premature to indulge in predictions. At present the market is firm, but dull, at prices above quoted. One sale of 5000 tons to a New England road is reported at $31.50, at mill.

Railway Supplies.—There is not much demand at present, but prices are fairly steady at 2.15¢ @ 2.25¢ for Spikes, 1.9¢ @ 2¢ for Fish Plates and 3¢ @ 3.10¢ for Track Bolts.

Crop Ends.—A sale of 500 tons for shipment to New York is reported at $20.50, and a 500-ton lot in store in Baltimore at $19, with further inquiry at about same figures.

Old Rails.—There is but little disposition to do business at present, although sellers are scarcely as firm as they were a week or two ago. Buyers talk about $21 @ $21.50 for T's for summer delivery, while sellers quote $22 @ $22.50 for spot or early arrivals. No sales reported, owing to the diversity of opinion as above indicated. An offer of $22.50 is made today for a lot of D. H.'s in New York, but they are held for more money.

Scrap Iron.—The market is easier and cargo sales not readily made, unless at concessions from quoted rates, which are about $20.50 @ $21 asked for No. 1, or $21 @ $21.50 for carload lots, or for choice $22.50 @ $23; No. 2 do., $14 @ $15; Turnings, $15 @ 16; Old Steel Rails, $20 @ 21; Cast Scrap, $16 @ 17; do. Borings, $11 @ $12; Old Fish Plates, $26 @ $27. Old Car-Wheels are in active demand at from $18 to $19, Philadelphia, or its equivalent.

Wrought-Iron Pipe.—There is no perceptible change in the general situation. Trade dull, and prices continue very unsatisfactory. Discounts are quoted as follows: Black Butt-Welded, 50 %; on Galvanized do., 42½ %; on Black Lap-Welded, 62½ %; on Galvanized do., 50 %; Boiler Tubes, 57½ %.

Nails.—No change to report. Very few Nails are being sold, and these generally in small lots. Inquiries are numerous, however, and a large spring trade is anticipated. Prices are quoted with some firmness at from $2.10 to $2.15 for lots from store.

J. H. Hoffman & Co., of Philadelphia, have been appointed selling agents for the Chattanooga (Tenn.) and Rising Fawn (Ga.) furnaces. Mr. J. W. Hoffman has accepted the position of general manager of these furnaces, as well as for the coal and ore properties of the Dade Coal Mines, Rogers R. R. and Ore Banks, Walker Coal and Iron Company, and Castle Rock Coal Company, and has placed Mr. C. B. Finley, late manager of the Kittaning Coal Company, in charge of the last-named properties, and Mr. J. W. Higgs (late of the Isabella Furnace), in charge of the furnaces. A competent chemist has also been appointed to conduct the analysis, so that these furnaces expect to turn out a very uniform and high grade of foundry iron.

The Reading Iron Works, Edward W. Coit, president, have removed their general offices and warehouses to 220-222 South Fifth street.

Pittsburgh.

Office of *The Iron Age*, 77 Fourth avenue, PITTSBURGH, PA., February 28, 1888.

There has been no important change in the general Iron and Steel situation during the past week. Andrew Carnegie, who is in the city for a few days, does not talk very hopefully as to business prospects. He does not know when the Edgar Thomson Rail mill will be started up. The trouble between the firm and the men is not very serious and may be settled within a day or two. Both parties have agreed to arbitrate, but while the men want the decision of the arbitration to extend for six months, the firm refuse unless it is fixed at one year. Mr. Carnegie says that the mill will not be started upon the terms proposed by the men, but it is the opinion of a good many that the men will accede to the firm's proposal. Mr. Carnegie regards the Steel Rail business as the most discouraging of any connected with the trade. He says that there is not a Rail mill in the country that has 60 days' work booked. In regard to the general Iron and Steel business he is of the opinion that the product will be much less and prices lower this year as compared with that of 1887.

Pig Iron.—The dullness noted for some time past continues, and the prospect for any substantial improvement is not as encouraging as it might be. Coke has been reduced 25¢ ₱ ton, making a reduction of 50¢ as compared with cost about the first of the year. This, of course, is quite an item to furnacemen, but in order to sell at present prices they claim that they must have cheaper labor, Ore, Limestone, &c. In order to meet the views of consumers furnaces must reduce cost of production, and this can only be done in the way indicated. As compared with those of a week ago, prices are easier and some sales were made at a decline of 25¢ ₱ ton. We quote as follows:

Neutral Gray Forge	$16 25 @ $16.75,	4 mos
White and Mottled	15 50 @ 16 00	"
Silvery Iron	18.70 @ 19.00	"
All Ore Mill	17.00 @ 17.50	"
No. 1 Foundry	18.00 @ 18.50	"
No. 2 Foundry	17.00 @ 17.50	"
Charcoal Foundry, No. 1	25.00 @ 25.50	"
Cold Blast Charcoal	27.00 @ 30.00	"
Bessemer Iron	18 00 @ 18.50	"

Muck Bar.—Continues dull, and prices are weak, in sympathy with the raw material; may be quoted at $27.50 @ $28, cash, although we know of no sales below $17.75. The failure of Graff, Bennett & Co. takes a large buyer out of the market. The firm in question has been a large buyer for a year or more, and some of their creditors are mill owners from whom they had bought Muck on time.

Manufactured Iron.—Trade continues light and unsatisfactory; orders are not coming forward as freely as was expected, and but few, if any, of the mills are working up to their full capacity. Some manufacturers talk encouragingly in regard to the near future, while others are doubtful; all are forced to admit that the situation, both present and prospective, is not as good as it was a year ago. The suspension of the two mills owned by Graff, Bennett & Co. will give more work to the other mills, but then it curtails the consumption of raw Iron, and throws a large number of men out of employment, and, moreover, the failure has a bad effect upon trade generally. Prices may be quoted at 1.80¢ @ 1.85 for Bars; Plate, 2.40¢ @ 2.45¢; No. 24 Sheet, 2.85¢ @ 2.90¢, all 60 days, 2 % off for cash. Car builders continue to buy pretty freely, but with this exception trade is light for the season. The demand for Pipe Iron, which has been light all winter, it is probable will show signs of improvement before long.

Nails.—The Nail trade continues light for the season, although there is more inquiry, and an increased business is looked for within the next week or two. The market is stiff here at $1.90, 60 days, 2 % off for cash, on carlots and upward, and it is said that Wheeling is now holding steady at the same figure. There is little or no margin for profit at present prices, but manufacturers here appear to be indifferent as to whether they get orders or not, and this being the case they are refusing to make any concession whatever.

Wrought-Iron Pipe.—There is no important change to note in this department of the Iron trade; orders continue scarce, but an improved demand is looked for before long. But few, if any, of the mills are working up to their full capacity at the present time. Prices continue unsettled and irregular, each firm making its own. Discounts on Black Butt-Welded Pipe,

50 %; on Galvanized do., 42½ %; on Black Lap-Welded, 62½ %; Galvanized do., 50 %; on Boiler Tubes, 57½ %; Casing, all sizes, 55 %; 2-inch Tubing, 13¢ per foot, net; 2-inch Line Pipe, 12¢, net.

Old Rails.—There is a fair demand in American Tees, several sales being reported at $24, cash, which has been the ruling price for some time past. Foreign Tees cannot be laid down under about $24.50, and as long as consumers can get American at $24 they will buy no foreign. As long as there is the difference in price noted there will be no sales of foreign Rails in this market.

Steel Rails.—Ore still quoted nominally at $31.50 @ $32, cash, at mill, for heavy sections. The Edgar Thomson Works are still standing idle, and, while they may be started up within a few days, they may stand idle for weeks to come. The Carnegie firm say if necessary they will work what orders they have for Rails at their Homestead Mill, which has been in operation for some time past on specialties.

Billets, &c.—The market for Bessemer Steel Billets is steady at $29.50 @ $30, cash, with nearly all the mills in operation pretty well sold up. Sale of 1000 tons reported at $29.40, deliverable at works of seller. Nail slabs are still quoted at $29 @ $29.50, cash. Domestic Rail Ends may be quoted in the absence of sales at $18.50 @ $18.75, and Bloom Ends at $18 @ $18.25. The low price of all kinds of American Steel has knocked foreign out of this market. Until within the last year or so, sales of foreign Billets and Crop Ends were quite common in this market.

Railway Track Supplies.—The demand continues light, but it is expected that there will be an improvement before long. Prices remain unchanged. Spikes, 2.60¢, 30 days, delivered; Splice-Bars, 1.90¢ @ 2¢; Track Bolts, 2.95¢ with square and 3.05¢ with hexagon nuts.

Old Material.—There is a fair business, but the demand is chiefly for small lots. Sales of No. 1 Wrought (railroad shop), $20, net ton; No. 2 do., $17 @ $18; No. 1 Wrought Turnings, $13 @ $13.50; Car Axles, $26; Cast Borings, $12 @ $13, gross; Cast Scrap, $16.50 @ $17, gross. There is no demand in this market for Old Wheels.

Chicago.

Office of *The Iron Age*, 95 and 97 Washington St., CHICAGO, February 27, 1888.

Pig Iron.—Although the market can hardly be called active, more Coke Iron has been sold in the past ten days than during any previous ten days since the beginning of the year. This is in itself quite encouraging, and the prospects are very favorable for still more business in the immediate future. Prices now seem to have gone down to a point at which consumers are not afraid to buy, and they are disposed to take hold more freely. Competition is quite sharp over orders of any size, and on one large transaction of the past week lower prices were made than any yet named since the present depression set in. The impression is general that bottom has not been touched, and will not be until production has been restricted by the blowing out of a considerable number of furnaces. This has already begun in some districts, and will continue as rapidly as furnaces use up their stock bought at last year's prices. In this condition of the local trade it is fortunate for the Northern furnace companies that Southern Coke Iron is not being pushed for sale here. Very few representatives of Southern furnaces have any Iron to offer now, their product having been absorbed in other directions. Lake Superior Charcoal Iron holds its own very well, most sellers talking very confidently of their ability to secure full prices as long as it continues so scarce and in such excellent demand. Cash quotations for small quantities are as follows, f.o.b. Chicago: Lake Superior Charcoal, all numbers, $21 @ $22; Alabama Car-Wheel, $26; Southern Charcoal Foundry, No. 1, $20.50 @ $21.50; Jackson County Softeners, No. 1, $20.50; Hocking Valley, Soft Foundry, No. 1, $19.50 @ $20.50; American Scotch, No. 1, $20.50 @ $21.50; Lake Superior Coke, all Ore, No. 1, $19.50 @ $20; No. 2, $18.50 @ $19; No. 3, $17.50; Cinder Mixed, 50¢ less; Southern Coke, No. 2, $19 @ $19.25; No. 2½ and Open Bright, $18.50 @ $19; No. 3, $18; No. 1 Mill, $17.50; No. 2 Mill, $17.25.

Bar Iron.—A very fair business is in progress, but it is entirely confined to small orders. Large buyers are out of the market at present. Although some mill representatives report prices weak, it is difficult to find any of them willing to sell Common Iron at less than 1.75¢, half extra, f.o.b. Chicago, unless it is of very inferior quality. Some are asking 1.70¢ at mill. Guaranteed All Muck Bar is held at 1.90¢ @ 2¢, f.o.b. Chicago. Store prices now range from 1.90¢ to 2.2¢, according to quality and quantity.

Structural Iron.—Orders are more abundant, both for buildings and bridges. Angles are quoted at 2.60¢ and Tees at 3¢ from store; Beams and Channels, 3.8¢ from store; Universal Plates, 2.50¢ @ 2.60¢ from mill.

Sheet Iron.—Negotiations are in progress for some round lots of Black Sheets, but the market generally is very quiet, with carload lots quoted at 3¢ @ 3.05¢, f.o.b. Chicago, for No. 29, for which the store price is 3.45¢, with concessions to best buyers. Galvanized is in excellent demand, with prices unchanged—namely, 60 % off for Juniata and 60 and 5 % off for Charcoal, with the usual allowance for large lots.

Plates.—Store trade has been much better during the past week, but large orders have been few. Store prices are as follows: Heavy Sheets, Nos. 10 to 14, 2.70¢; Tank Iron, 2.70¢; Tank Steel, 3¢; Shell Iron, 3¢; Shell Steel, 3½¢; Flange, 4¢; Fire-Box, 4.75¢. Boiler Tubes are still quoted at 55 % @ 57½ % off.

Merchant Steel.—Nothing new has occurred in this line. Quotations are as follows: Bessemer Bars, 2.45¢; Tool Steel, 8½¢ @ 9½¢; Specials, 13¢ @ 25¢; Crucible Spring, 4.25¢; Open-Hearth Spring, 2.9¢; Open-Hearth Machinery, 2.75¢ @ 3¢; Crucible Sheet Steel, 7¢ @ 11¢.

Steel Rails.—Business has been very quiet since our last report. Negotiations are in progress, but no sales are known to have been affected, which is contrary to the expectation, latterly entertained, that railroad companies would now generally place their orders for the season's requirements. Probably the belief in a revision of the tariff and a reduction of the Steel Rail duty may have something to do with their hesitation, as a lower price would then be looked for. But even if the duty were cut down $5 or $6 a ton, which is the utmost expected, the present price of Steel Rails would not be affected, as it is now more than the figures named below the cost of importing foreign Rails. Quotations continue at $34 @ $35 at mill for heavy sections.

Old Rails and Wheels.—Sales of Old Iron Rails are reported to the extent of 600 tons at $22 and 100 tons at $21.75. Very few lots are offering at present, and the demand is not great. A larger movement than usual has taken place in Old Car-Wheels, the basis of transactions generally having been $21. Old Steel Rails are quoted at $18 @ $18.50, all lengths, free from Frogs, &c.

Scrap.—All kinds of Scrap are now comparatively scarce, except Steel Scrap. Forge and Cast are especially in short supply, but the price of the latter is firm, while that of the former is weak. Sales of Mill and Borings and Turnings have been made to some extent during the week, but trade generally has been quiet. For Mixed Country Scrap dealers are now offering $13 @ $14. Selling quotations for carefully selected are as follows, ℔ ton of 2000 lb: Railroad Shop or No. 1 Forge, $21; Track, $19; No. 1 Mill Iron, $16 @ $17; Light Wrought, $9.50 @ $10.50; Machinery Cast, $16 @ $16.50; Stove Plate, $12.50 @ $13; Cast Borings, $10; Wrought Turnings, $12 @ $12.50; Axle Turnings, $14.25 @ $14.50; Coil Steel, $15; Leaf Steel, $16 @ $16.50; Locomotive Tires, $17 @ $17.50; Horseshoes, $19.50; Axles, $26 @ $26.50.

General Hardware.—The demand is heavier than last week and some establishments are not able to get out orders as fast as they should do to meet the wishes of their customers, although they have largely increased their force of packers. The low freight rates are now affecting trade very perceptibly, buyers sending in their orders and asking for prompt shipment while these rates continue.

Nails.—A very active jobbing trade is in progress, both in Cut and Wire Nails, and stocks have been heavily reduced, the factories not shipping fast enough to keep pace with the demand. Some sales of round lots are being made by manufacturers' agents, but they are principally to jobbers at points further West, the local trade being well contracted ahead. Steel Cut Nails are quoted at $2.05 for carload lots, on track at Chicago; $2.10 for mixed carloads from store, and $2.15 @ $2.20 for small lots. Wire Nails are quoted at $2.70 for carloads and $2.80 for small lots.

Barb Wire.—The demand continues very good. Jobbers' quote: Painted at 3.10¢ for carloads, 3.15¢ for mixed cars and 3.20¢ for small lots, with the usual ¼¢ advance for Galvanized.

B. K. Keen, the general agent of the Springfield Iron Company in Chicago for the past four years, has severed his connection with that company and has established a new firm under the name of B. L. Keen & Co., whose office is at 184 Lake street. They will be the direct Western agents of several leading mills making Bar and Plate Iron and Steel, Cut and Wire Nails, Railway Track Supplies, &c.

J. M. Larimer, manager of the Chicago branch of Jones & Laughlins, took his family to California on the 14th ult., to be gone six weeks. The objects of his trip are recreation and a brief respite from the wearing duties of his position. During his absence D. N. Barker has charge of the business of the house.

The following notice was issued on the 23d ult. by Charles Himrod & Co., Pig Iron merchants, of Chicago and Detroit: "The partnership heretofore existing in Chicago and Detroit under the firm name of Charles Himrod & Co. is dissolved this day by mutual consent. W. F. Jarvis will continue the Pig Iron commission business in Detroit, under the firm name of W. F. Jarvis & Co., and will collect all accounts due to and pay all liabilities of the Detroit office of Charles Himrod & Co. Charles Himrod and Kirk Himrod will continue the business as Charles Himrod & Co., at Chicago, paying all debts and collecting all accounts due the Chicago office."

Chattanooga.

Office of *The Iron Age*, Carter and Ninth Sts., CHATTANOOGA, TENN., February 27, 1888.

A subject that is being looked upon with much interest by the Southern people,

especially those who are interested in and around the manufacturing centers, is the arrangements lately made by the railroad lines leading South from Northern points to bring prospectors at greatly reduced rates. It has resulted in nearly all the trains being filled with business men, mostly from the Northwest, who are looking round the country and seeing what advantages we possess for manufacturing. It is thought by many that this movement will eventually bring a greater degree of prosperity and improvement than anything that has yet occurred. The question of negroes as mechanics has probably been tested in this city more than any other point in the United States, and it has resulted in establishing beyond question the availability of this class of labor for certain purposes. There are two large concerns in this city that some five years ago put negro molders exclusively on their floors, and up to the present time they have been entirely successful with them. They are doing as much work and doing it as well as white men, and have been no trouble at all to their employers in any way. Most of them abstain wholly from any intoxicating drinks, and, as a general thing, they are saving nearly all of their surplus earnings. There has not been a single instance where any of them have been interfered with in consequence of their color or for not belonging to the union.

Pig Iron—Continues about in the same condition as our last report. There does not appear upon the surface at least the same tendency to dullness that is reported elsewhere. Those furnaces that are under contract, of which there are some whose contracts extend through the year, give themselves little concern about the market; what little surplus they have they find a ready market for with Southern consumers, who are also taking largely from other stacks, and it is probably safe to say that no good grades are being piled up in any of the yards. There is probably not a producer in the Southern districts but what is feeling himself quite on a safe foundation in reference to the future so far as prices are concerned, and as long as these stacks are turning out good iron they can always place their output at a profit.

Cincinnati.

Office of *The Iron Age*, Fourth and Main Sts., CINCINNATI, February 27, 1888.

Pig Iron.—The past week has been a very dull one in the local Pig-Iron market, with an easier feeling prevailing, but the changes have been so small and so few that the general tenor of the market has led to no structural change in the quotations. Buyers, however, regard the situation as in their favor, and are not disposed to make contracts for large amounts extending into the future. The tendency toward lower prices, however, is largely confined to the product of Northern furnaces, the Southern producers, being sold so far ahead and unable to deliver such amounts as they have already sold, being exempt from this weakness for the present. Some buyers, however, are thus forced into the market, being unable to obtain the supplies already contracted for with Southern agents. Silvery Gray and Ohio Softeners are reported in over supply, the industries which consume them principally having done but little since December. No transactions of any magnitude are reported for the past few days, but there are some contracts of moment expected to be consummated in the near future. Quotations are as follows:

Hot-Blast Foundry.

Ohio Southern Coke, No. 1	$19.50 @ $20.00
Ohio Southern Coke No. 2	18.00 @ 18.50
Ohio Southern Coke, No. 3	17.50 @ 18.00
Ohio Soft Stone Coal, No. 1	19.50 @ 20.00
Ohio Soft Stone Coal, No. 2	18.00 @ 19.50
Mahoning and Shenango Valley	20.00 @ 20.50
Hanging Rock Charcoal, No. 1	22.00 @ 24.00
Hanging Rock Charcoal, No. 2	21.00 @ 23.00
Tennesse and Alabama Charcoal, No. 1	20.00 @ 21.00
Tennessee and Alabama Charcoal, No 2	19.00 @ 20.00

Forge.

Strong Neutral Coke	17.00 @ 17.50
Mottled Neutral Coke	15.25 @ 15.75
Cold Short	16.00 @ 17.00

Car-Wheel and Malleable Irons.

Southern Car-Wheel	23.00 @ 24.50
Hanging Rock, Cold Blast	24.00 @ 25.00
Lake Superior Car-Wheel and Malleable	22.00 @ 23.00

Old Rails and Wheels.—There has been a dull and weak market for Old Rails, which are nominally quotable at $21.50 @ $22 ℔ ton, but there have been moderate sales of Old Wheels at $20.50 @ $21 ℔ ton.

Nails.—There has been a fair jobbing demand, and a steady market. Iron 10 @ 60d sell at $2 @ $2.10, and do. Steel at $2.10 @ $2.20 ℔ keg, and other sizes at proportionate rates.

Manufactured Iron.—The market has changed but little and prices have remained steady. The demand is fair for small mounts, but no large transactions are reported. Bar and Sheet Iron—Common Bar Iron, 2¢; Charcoal Bar Iron, 3¢; Sheet Iron, boiled, Nos. 10 to 27, 2.60¢ @ 3.30¢; Sheet Iron, Charcoal, Nos. 15 to 25, 3½¢ @ 4½¢ ℔ lb.

Louisville.

LOUISVILLE, KY., February 27, 1888.

Pig Iron.—The market has held its own, and during most of the week buying has been moderate. Parties are in the market now for round lots, and are willing to pay prices asked and a trifle higher, and at which some sales have been effected during the last two months. Buyers of standard Southern Irons, we think, will have difficulty in getting other brands, as the quantity of Iron that furnaces can supply for prompt shipment is limited, especially among Mill grades. We hear of several furnaces that are going out of blast owing to the low prices of Irons, these furnaces being located largely in the Hanging Rock District. Old Wheels are in steady demand at about $20, cars, Louisville, and there are inquiries for Old Rails on basis of $21 that cannot be obtained.

Southern Coke, No. 1 Foundry	$18.50 @ $19.50
" No. 2 "	17.50 @ 18.50
" No. 2½ "	17.00 @ 18.00
Hanging Rock, Coke, No. 1 Foundry	19.00 @ 20.00
Hanging Rock, Charcoal, No. 1 Foundry	22.50 @ 24.00
Southern Charcoal, No. 1 Foundry	19.50 @ 21.50
Silver Gray different grades	16.00 @ 17.00
Southern Coke, No. 1 Mill, Neutral	16.00 @ 17.00
" No. 2 " "	15.50 @ 16.50
" No. 1 " Cold Short	15.50 @ 16.50
White and Mottled, different grades	15.00 @ 16.00
Southern Car-Wheel, standard brands	23.00 @ 24.00
Southern Car-Wheel other brands	20.00 @ 21.00
Hanging Rock, Cold Blast	24.00 @ 25.00
Hanging Rock, Warm Blast	20.00 @ 21.00

Cleveland.

CLEVELAND, February 27, 1888.

Iron Ore.—Absolutely nothing new has transpired. Dealers have not sold 1 pound of new Ore, and will not be likely to force an already weak market. It is said that the Ore producers are willing to knock 50¢ off last year's prices, but furnacemen insist that, if they are to do business at all, Ore must come down at least $1 a ton, and probably more. This means lower vessel rates and lower wages for mining labor. Coke labor has already been reduced 10 %, and prices are now $1.50 to furnacemen at Connellsville—a cut of 25¢ ℔ ton. There is little likelihood of any Ore sales inside of two weeks.

Pig Iron.—The market remains dull and weak, and is characterized by the attempts, in some quarters, of still further lowering quotations by offering Iron at any price. It is evident that some smaller concerns are being squeezed hard, and they must convert their Ore into cash at any sacrifice. The larger furnaces decline to enter the scramble, and are preparing to shut down rather than run at a loss. In any event somebody will have to meet the difference in the price of Ore if the present dullness should continue much longer, and, as Iron made from '88 Ore can be sold considerably cheaper than ruling quotations, the losses will be heavy. Cleveland prices are on a basis of $19 for No. 1 Foundry, four months.

Old Rails.—There is some little demand for Old American Rails for working into Bar Iron, and the price paid for a round lot here is about $23.

Manufactured Iron.—Bar Iron is selling in small quantities, carlots going at $1.75 @ $1.80. Sheet is a trifle more firm, the mills refusing work at anything below $2.70 for No. 24.

Barb Wire.—Manufacturers report continued depression and large stocks. This applies to all kinds of Wire.

Nails.—Cut Nails are firmer owing to the Eastern combination, and $1.85 is asked for Iron in large lots, with 10¢ added for Steel.

Detroit.

W. F. JARVIS & Co., dealers in Iron, Detroit, Mich., report, under date of February 27, 1888, as follows: The market for the past week has been somewhat dull. It cannot be disguised that the price of Coke Irons of all descriptions is decidedly off, nor will there be any prospect of any great improvement unless the Steel Rail industry does something pretty soon. With Coke, however, at $1.50 at the ovens, the Northern furnaces have a little better chance. Vessel men are endeavoring to take the position that there will be a sufficient demand for their bottoms for the lumber industry to keep the Lake rate of Ore near the position of last year, but this seems utterly out of the question, and a much lower figure to rule throughout the year is expected, probably starting at $1.25 @ $1.35 from Marquette. Lake Superior Charcoal Iron has been active in spots, but no general demand has existed, and statistics show a slight increase in amount on hand during this month. The car industry seems to be the busiest here at the present time. We quote the market as follows:

Lake Superior Charcoal, all numbers	$21.50 @ $22.50
Lake Superior Coke, All Ore	21.25 @ 21.75
Lake Superior Coke, Cinder Mixed	19.00 @ 20.00
Standard Ohio Blackband	21.50 @ 22.00
Southern No. 2	19.25 @ 19.75
Southern Silvery	18.50 @ 19.00
Jackson County, Ohio, Silvery	20.50 @ 21.50
American Old Iron Rails	24.00 @ 26.00
Old Wheels	21.50 @ 22.00

Metal Market.

Copper.—The week under review opened on Thursday last in the London market at £78. 15/, and the next day improved to £79, sales during the two days taken together amounting to 950 tons, while here some 825,000 lb were sold on the Metal Exchange at 16.10¢, spot, and 16.10¢ @ 16.15¢, March, 16.40¢, April, 16.30¢ @ 16.35¢, June, and 16.25¢, July. Consumers have not neglected picking up lots of Copper of moderate size from speculative holders wherever the latter showed a disposition to rid themselves of such parcels, and in this manner last week wound up satisfactorily to the consuming interest. On the London Stock Exchange Rio Tinto Copper shares declined last week 3½, at Paris 20 francs, being 87 francs lower since the last settlement. On February 27 they recovered 14 francs on

London orders being filled. On Monday London came 10/ lower, being cabled £78 and sales reaching 725 tons, our own market exhibiting a sluggish spirit at 16.10¢ for February and March, 16.20¢ for April and May, and June, 16.30¢. Messrs. James Lewis & Son, Liverpool, February 16, express themselves to the following effect: "Manufacturers are receiving such large quantities of all sorts and kinds of Old Copper at comparative low prices that they are not inclined to purchase Ingots. Best Selected in Birmingham has therefore not been worth more than Chili Bars here. The import of American Copper from January 1 to February 16 into Liverpool and Swansea was 3985 tons Fine, against 162 in 1887." While advancing 7/6 in London to £78. 17/6, with 475 tons sold, our own market was flat and lower yesterday, March selling at 16.05¢, April at 16.20¢, and May at 16.25¢. To-day sales of spot have been made at the Metal Exchange of about 1,000,000 lb, chiefly spot, at 16¢, thus reaching the figure which has been paid lately outside for small blocks. The market closes stronger with spot and March 15.95¢ bid and 16¢ asked, April 16.30¢, and May and June 16.30¢ bid. Casting Copper ranges between 15¢ and 15¼¢. Lately one of the refineries has sold to another quite a block of Casting Copper, the bulk of which appears to have been exported lately. No official confirmation has yet been obtained that an arrangement has been concluded with the syndicate by the Calumet and Hecla Company. There is reason to believe that after the first fire and before the breaking out of the second this company sold a considerable quantity of Copper to consumers, delivery of which is still going on and will not be completed before May. It is certain that quite a number of manufacturers are supplied up to that date, and they seem determined to keep out of the market until then. It is insisted that the smaller speculative interest is being eliminated, and that floating Copper is being rapidly concentrated in a few hands among these leading dealers. We print editorially a discussion of one phase of the syndicate methods which has until now been given little attention in the public prints. So far as its movements are concerned it may be stated that the Boston and Montana Company have extended their agreement with the syndicate for three years, the quantity involved being 15,000 tons Fine annually. From an excellent source in Chili comes direct the following statement. In 1887 the output of that country was 6800 tons under the make of 1886. Owing to the scarcity of labor it will be practically impossible to do more than make this up in 1888, so that the output of that year will be about equal to that of 1886. Cable reports allude to the difficulties which the Rio Tinto Company are having with the Spanish Government over the nuisance and damage to adjacent territory growing out of their system of calcining their Pyrites. As we have already stated, the company have for some time been gradually abandoning the old method of open heap calcining for the Doetsch process, by which the Copper is leached from the raw Ore without preliminary roasting. London closes at £78. 17/6.

Tin.—With the syndicate still in full control transactions have not been heavy, except in May Tin, of which sales have been made during the week aggregating over 100 tons at 31.60¢ down to 31.45¢, with 31.50¢ at the close, while April has sold to a limited extent at 33.25¢ @ 33.30¢, and February earlier in the week at 36.50¢. At the close 36.25¢ is asked for spot, 35.85¢ bid and 36¢ asked for March, and 33.05¢ bid and 33.35¢ asked for April, and 31.35¢ for May. London closes £166 for spot and £143 three months.

Tin Plates.—There is very little to be said about the Tin-Plate market this week. A chief characteristic continues to be the short stock of Cokes on this side of the water. Ternes, however, being in fair supply. For the past week or so Cokes have been rather easier, and consequently buyers are holding off in the hope of purchasing at lower figures. Trade is therefore a little lighter than it has been, but, as explained, the slackening is not due to any actual falling off in consumptive demand. There are already signs of the awakening of spring trade in Terne Plates. We quote the New York market as follows for large lots: Siemens-Martin Steel, Charcoal finish, $5.10 @ $5.30, ditto, Coke finish, $4.90 @ $5; Ternes, $4.20 @ $4.30; Bessemer Coke, $4.70 @ $4.75, and Wasters, $4.62½.

Lead.—Early in the week speculative purchases to the extent of about 700 tons were made at the Metal Exchange, prices advancing to 5.15¢ for spot and 5.17½ for March delivery, with considerably higher figures for later options. Consumers maintain an attitude of opposition to this speculative movement.

Spelter.—The market is quiet at 5.25¢ @ 5.30¢ for March delivery.

Antimony.—We quote Hallett's 11¢ and Cookson's 14½.

New York Metal Exchange.

The following sales are reported:

THURSDAY, February 23.

80 tons Tin, May	31.60¢
10 tons Tin, May	31.55¢
50 000 lb Copper, April	16.40¢
25,000 lb Copper, June	16.30¢
25,000 lb Copper, June	16 35¢
20 tons Tin May	31 50¢
20 tons Tin. May	31.45¢
25,000 lb Copper. spot	16.10¢

FRIDAY, February 24.

10 tons Tin, March	35.95¢
175,0 0 lb Copper, March	16 10¢
25,000 lb Copper, July	16.25¢
200 000 lb Copper, March	16 15¢
10 tons Tin, May	31.45¢
100,000 lb Copper, February	16.10¢
112 tons Lead, spot	5.07½¢
32 tons Lead, February	5.10¢
48 tons Lead, March	5.07½¢
112 tons Lead, March	5.10¢
10 tons Tin, February	36.50¢
10 tons Tin, May	31.35¢
10 tons Lead, April	5.15¢
100 tons Lead, April	5.17½¢

SATURDAY, February 25.

16 tons Lead, September	5.25¢
16 tons Lead, October	5.25¢

MONDAY, February 27.

10 tons Tin, April	33.25¢
25,000 lb Copper, April	16 20¢
48 tons Lead, February	5.12½¢

TUESDAY, February 28.

25,000 lb Copper, May	16.25¢
25,000 lb Copper, April	16 20¢
100,000 lb Copper, May	16.25¢
100 tons Lead, February	5.12½¢
16 tons Lead, February	5.15¢
32 tons Lead, March	5.15¢
16 tons Lead, March	5.17½¢
10 tons Tin, May	31.50¢
10 tons Tin, April	33.30¢
50,000 lb Copper, July	16.30¢

WEDNESDAY, February 29.

500,000 lb Lake Copper, spot	16.00¢
125,000 lb Lake Copper, March	16 00¢
50,000 lb Lake Copper, April	16.15¢
25,000 lb Lake Copper, May	16.25¢
25,000 lb Lake Copper, spot	15 95¢
150,000 lb Lake Copper, April	16.20¢
25,000 lb Lake Copper, June	16 30¢
400,000 lb Lake Copper, April	16.30¢
100,000 lb Lake Copper, April	16.25¢
10 tons Tin, March	36.00¢

Coal Market.

The Anthracite Coal market is nearly restored to the *statu quo ante bellum*, the Reading mines being now fully at work, and in the Lehigh region considerable progress has been made toward resumption. At Elizabethport and Port Richmond the shipping of Coal has actively commenced, aided by machinery which provides for more rapid dispatch with a reduced force. The market is dull, and prices are not so strong, particularly for Free-Burning Coal, which is in good supply. Even at the reduction Coal is not wanted in any amount. The Reading Company announce their prices as follows for the month of March: Port Richmond: Hard White Ash—Lump and Steamboat, $4.25; Broken, $4; Egg, $4.15; Stove, $4.65; Chestnut, $4.40. Free-Burning White Ash—Broken, $3.85; Egg, $4. From Elizabethport: Hard White Ash—Lump and Steamboat, $4.50; Broken, $4.25; Egg, $4.40; Stove, $4.85; Chestnut, $4.65. Free-Burning White Ash—Broken, $4.15; Egg, $4.25. For Lykens Valley Coal the prices from Port Richmond have been fixed at $4.50 for Broken, $5.25 for Egg and Stove, and $4.75 for Chestnut. Free-Burning Coal, it is expected, can be bought below the prices here named. At the mines, furnace sizes are reduced to $2.25, and the good effects are seen in the starting up of furnaces at various parts. President Harris, of the Lehigh Coal and Navigation Company, while prepared to resume in full, says the operators "are not willing to listen to the mediation of third parties nor to concede the right of the men to send representatives to confer for them," in this respect declining to accept the conditions recognized in the Reading settlement. The collieries will be started up as fast as the men choose to go to work, but no distinction will be made between union and non-union men.

The weekly production of Anthracite Coal steadily augments, the total for the week ending February 25 being 654,352, an increase of nearly 26,000 tons compared with the previous week. The Schuylkill region suddenly jumped from 35,000 tons to 100,000 tons, which accounts for the gain, but this was partly at the expense of the Wyoming, which, meanwhile, lost 34,000 tons, probably in consequence of some of the men returning to their former positions in the Schuylkill. For the year the aggregate production is 4,634,430 tons, as compared with 4,769,503 for the same time in 1887.

Baltimore Coal is dull. The Seaboard Steam Coal Association announce prices for the season beginning March 1 the same as last year, as follows: Free on board at Philadelphia, Norfolk, Newport News, Baltimore and Georgetown, $2.60 per ton. Free on board at South Amboy, Perth Amboy, Elizabethport, Port Johnson, Weehawken, Hoboken and Port Liberty, for shipment to points on the North River south of Fifty-seventh street, and to points on the East River west of Hell Gate, $3.25 ℔ ton. Delivered alongside in New York harbor south of Fifty-seventh street, North River, and on the East River west of Hell Gate, $3.50 ℔ ton. The tidewater Soft Coal tonnage to be divided during the coming season has been fixed at 5,000,000 tons, the same as last year.

The Pennsylvania Railroad last week carried 217,000 tons of Coal and the Reading 75,000 tons. Vessels are reported scarce at Port Richmond, and freights are quoted at $1.25 @ $1.35 and discharge to Boston and $1 @ $1.10 and discharge to Providence.

The Australian trade with the United States is constantly increasing, notwithstanding the difficulty in obtaining cargoes for the return from the "island continent." There are three firms in New York and one in Boston, all of which are doing a fair business. A leading merchant says: "We could to-day charter vessels on the basis of 45/ per ton, out and back, if we had the return business, but with no home freight it costs 30/ out alone. There is a large export from here of our agricultural implements, which stand in high favor all through the colonies. Our shovels and axes have almost a complete control over the trade, because they are better made and are lighter."

Foreign Markets.

EQUIVALENTS.

	Cents.
Franc, Peseta or Lira	19.3
Florin (Netherlands)	40.2
Florin (Austria)	35.9
Milreis (Portugal)	$1.08.
Milreis (Brazil)	54.6
Mark (Germany)	23.8
	Pounds.
Kilogram	2205
Picul	134.

GREAT BRITAIN.

In the North of England there has been rather more disposition to buy Pig Iron, and this has slightly strengthened the market. The prevailing figure for No. 3 prompt is 31/6 and 31/10½ @ 32/ forward for April to June delivery with merchants. There has been a better feeling at Newcastle, and the decline of 6d ₱ ton recorded last week has been rather more than recovered. In Lancashire a dull tone has prevailed, but the market in Staffordshire and East Worcestershire has been tolerably steady. In the Northwest the Hematite market has been weaker, and business has been done in warrants as low as 33/ ₱ ton, less 2½ % a month; but makers refuse to accept this quotation as in index of the position of the trade. They are quoting, in fact, 43/ for mixed numbers of Bessemer Iron, net, f.o.b., and 42/3 for No. 3 Forge and Foundry Iron, and well-known brands have changed hands during the week at these values. The Glasgow warrant market has been flat and prices closed to-day as follows: 39/1½ @ 39/2 cash, and 39/4 @ 39/4½ one month. In the North of England the Manufactured Iron trade shows no change. The rates are about: Common Bars, £4. 17/6; Best Bars, £5. 7/6; Ship Plates, £5; Boiler Plates, £6; Sheets, £5. 17/6; Angles, £4. 12/6; less 2½ %. Business at Newcastle has not been quite so strong. In Lancashire makers are mostly firm, but here and there a disposition to give way slightly is noticeable. Trade in East Worcestershire and North Staffordshire has undergone no change. Trade in South Staffordshire remains steady. Prices are firmly maintained at £6. 10/ for Black Sheets (singles), and £6. 15/ @ £7 doubles. Boiler Plates range from £7. 10/ to £9. 10/. Second-class Bars are in slow request at £6, but there is a fairly good inquiry for common descriptions at £5. The Tin-Plate Market has been somewhat less steady. In the Northwest, the Steel trade is firm in all departments. There is a good inquiry for Steel Rails, and prices are unaltered, heavy sections of Rails being still quoted at £4, net, f.o.b., and light sections at £4. 5/. There is an increased inquiry for steel shipbuilding material. Recent transactions have been at £7. 2/, f.o.b., for Plates, and £6. 7/6 for Angles. Hoops are in good demand at £6. 2/. The Scotch Steel works are busy, and prices are steadily maintained. In the North, there has been a lull in the demand, and this has rather weakened prices. Rails could be placed at less than £4, though this is the usual figure. Ship Plates are £6. 15/ @ £7, and Angles £6. 10/ @ £6. 12/6. Steel Boiler Plates continue very firm at £8. 5/, delivered in the Manchester district, and business is being done at these figures. No material change can be reported in the shipbuilding and engineering trades, except that the former is rather quieter. —*London Economist, February* 18.

EAST INDIES.

Singapore, January 16, 1888.—*Tin.*—Sales during the fortnight amount to 350 tons at up to $56.50, the market closing quiet with buyers at $56.25. Supplies are not overplentiful, probably owing to recent floods up country. *Tonnage* is abundant, and the exports for the month will be large. For New York the S. D. Carleton is loading. The Carl Both has taken the berth at 22/6 for weight and 25/ for light stuff. For Boston the Jenny Parker sails shortly. *Exchange* is down to 3/2¼ for six months' sight credit. Total shipments from the Straits Settlements to the United States in 1887: 70,916 piculs, against 82,015 in 1886; 43,989 in 1885; 59,901 in 1884; 114,284 in 1883, and 109,025 in 1882.—*Gilfillan, Wood & Co.*

Penang, January 10, 1888.—*Tin.*—Receipts during the fortnight amounted to 15,000 piculs, out of which 13,500 were sold to Europeans and 1000 to Chinese. The market opened at $55.25, receded to $54.90, and subsequently rose to $56.60, in order to close at $55.75, at which the bulk was taken for Europe. The export hence to England in 1887 has been 161,784 piculs, against 151,235 in 1886 and 146,130 in 1885; to the Continent it was 4365, against 3059 and 1341 respectively, and to the United States, 15,990, against 50,806 and 21,394. *Gutta-Percha* is dull at $60 @ $100 Prime, and $11 @ $50 Ordinary. *India Rubber*, $60 @ $70, all ₱ picul. *Exchange*, four months', bank, 3/2¼.—*Schmidt, Kustermann & Co.*

Colombo, January 19, 1888.—*Plumbago*—Has been moderately active and steady. We quote at the close in rupees ₱ ton: Large Lumps, 145; Ordinary Lumps, 115 @ 145; Chips, 80 @ 90, and Dust, 37.50 @ 60. *Coir Yarn.*—Nos. 1 to 4 may be quoted 8.50 @ 12 rupees ₱ cwt., and *Ebony* 85 @ 120 ₱ ton. Plumbago shipments to the United States since October 1 foot up 61,880 cwt.; to England, 29,787; to Marseilles, 38; to Hamburg, 491; to Antwerp, 1524, and to India, 62; together, 93,782 cwt., against 80,025 the previous year, 56,955 in 1886 and 56,020 in 1885. *Exchange*, six months' sight, 1/5 7-16.—*Volkart Brothers.*

Manila, February 6, 1888.—*Hemp.*—Fair Current has advanced from £29. 10/ to £29. 15/, cost and freight. Received during the week 15,000 bales, making 49,000 since January 1. The market closes quiet. *Exchange*, six months' sight, London, 3/8.—*Smith, Bell & Co.*

WEST INDIES.

Port of Spain, Trinidad, January 21, 1888.—*Asphaltum.*—Our market has been moderately active and steady at $13.25 ₱ ton Boiled and $5.50 Crude. Shipments so far in the year amount to 2781 tons, against 975 tons same time last year and 750 in 1886. *Exchange*, 90 days, London, $4.77 @ $4.83.—*E. P. Masson.*

BRAZIL.

Para, January 18, 1888.—*India Rubber.*—According to statistics furnished by Messrs. Barros & Vianosa, of this city, the export of Amazon India Rubber from here amounted last year to 14,086 tons, against 13,006 in 1886, the increase consequently being 1080 tons. Our market has been quiet, owing to the rise in Exchange. India Rubber from the 'slands may be quoted 2350 reis for Fine and 1450 for Coarse, while Amazon River is 100 reis dearer for both kinds. *Exchange*, on London, 90 days' sight, may be quoted 24½d.—*O Commercio.*

Additional per cable direct, dated February 24.—The market is firm with a further advance in prices, the election of Baron Vianna as managing director of the Union Company imparting a more confident feeling, so that 300 tons were taken at a cost equal to 76¢ landed in New York for new Rubber, the market closing firm at the advance.

SPAIN.

Bilbao, February 1, 1888.—*Iron Ore.*—Our market has been firm, although dealings have been insignificant, mine owners not feeling disposed to make further contracts unless it be at better prices, stocks of Ore being reduced for the time being. Rubios have been selling at 6/9 @ 7/3 and Campanil at 7/9 @ 8/. Shipments have been exceptionally large, reaching as they did 83,728 tons. Total shipments since January 1 amount to 359,747 tons, against 308,590 tons last year. *Pig Iron* has been dull, only 930 tons have been taken for the interior and 30 tons for export.—*Bilbao Maritimo y Comercial*

GERMANY.

Hamburg, February 18, 1888.—*Iron.*—In Pig Iron consumption is outrunning production in Rhenish-Westphalia, and a good many blast furnaces have sold out their make all the way to July. Spiegel has continued active and rising, and is now worth 59 marks for 10 to 12 % Manganese. Last year 10 % more Spiegel was sold than in 1886. There is also a better inquiry for Forge Pig, sales having been made ahead all the way to July 1 at 53 marks. More Foundry Pig is also selling; the trade therein is satisfactory within the range of 51 @ 57 marks, as to quality. Thomas is in active request, and is not procurable for less than 45. This is also the case with Bessemer, at 53 @ 54. The position of Merchant Iron remains as favorable as heretofore, but the export demand is slack. Makers have booked orders enough to keep them busy steadily; specifications, are, however, coming in but slowly. The orders extend to the month of May. Prices remain firm, but are out of proportion low compared with the raw material, hence the impression prevails that soon prices will have to be enhanced. A similar rise seems to impend as regards Boiler Plates, for which the inquiry remains good. Orders for Thin Sheets do not abound much at present, but this is partially due to the season, and the demand will revive in the spring. The Wire branch is the reverse of active, sales for export having fallen off somewhat. Nothing new seems to transpire in railroad material to speak of, the railways having bought or contracted pretty much all they stand in need of just now. Car manufacturers have received orders for 14 passenger cars. Foundries and machine shops are to a tolerable extent actively engaged; they have no cause for complaint. Prices in those branches are steady. Merchant Iron is worth 125 marks, Angles command 132.50; Hoops, 140; Billets, 135, and Wire Rods, 116. Drawn wire may be quoted 130, while Wire Nails are worth 145. In Upper Silesia Pig Iron of all kinds continues doing well. The foundries have made arrangements for a common sales office at Gleiwitz. All rolling mills are satisfactorily booked. *Metals.*—After some fluctuations our market has steadied, consumers now willingly submitting to current quotations, activity extending to pretty much all metals alike.—*Borsenhalle.*

FRANCE.

Paris, February 18, 1888.—*Metals.*—Since our last report the market has been moderately active and unaltered at ensuing quotations: *Copper*, Chili Bars, 190 @ 195 francs ₱ 100 kg.; Ingots and Slabs, 192.50; Best Selected, 197 50, and pure Corocoro Ore, 185; *Tin*, Banca, 425; Billiton, 420; Straits, 440, and English, 420; *Lead*, 37 @ 38, and *Spelter*, 53 50 @ 54.50. *Iron.*—Our Saint Dizier correspondent writes us under yesterday's date: "Our market remains firm at 14 francs ₱ 100 kg. for the four classes of Lake Merchant. Machine Mixed is firm; both Iron Wire and Wire Nails continue tending upward, and a new price-list is to be fixed. Shoe Nail manufacturers had a meeting, at which a 4 per cent. rising of prices was resolved upon. Chains are also rising in price, in accordance with the improvement in the raw material." Following is the report from Valenciennes: The general position of the Iron market here is steadily gaining strength, and as the outlook for the spring trade seems to be of the most encouraging kind, the advance in prices seems to be on the eve of another step onward. Indeed, the impression seems to be general that some time will pass ere prices will give way again to where they stood in November and December. Gradually inland places are conforming to the ruling in the northern department, although Rouen has been rather slow in following suit.—*Moniteur des Intérêts Matériels.*

BELGIUM.

Brussels, February 18, 1888.—*Iron.*—Since our last report the general Iron situation in Belgium has undergone but little change. Prices have remained generally unaltered, consumers suscribing to them without hesitation in most cases. Works have, most of them, booked orders enough to keep them going, the larger concerns in particular. Quite a large export trade is being done. Not much of interest is reported from Liege just now. The tendency there seems to be good for the time being, so far as Pig Iron is concerned, while both finished Iron and Steel are less firmly held, the rolling mills not having an abundance of orders just now. Structural Iron might also be more active in the district. As for railroad material, the demand for rolling stock at Liége is moderately active; 500 Coal cars have been ordered for domestic use and 64 Locomotives for Italy.—*Moniteur Industriel.*

AUSTRIA.

Vienna, February 16, 1888.—*Iron.*—The general business outlook for the spring trade being favorable in Austria Hungary, it is believed that the demand for Iron, Hardware, Hollow-ware and Agricultural Tools and Machines will set in both early and strong, hence the tendency in the Iron and Steel branches generally, if anything, favors a gradual advance in prices, and this is the feeling prevailing in this city particularly. The trade in Pig Iron has been very active during the week at well-sustained prices. Merchant Iron is also wanted and firmly held. Sheet Iron and Plates, both Styrian and Hungarian, have been raised in price 5 florins ₱ ton. All Galvanized Wares, together with Tin Plates, are moving off satisfactorily. Beams are quiet and unaltered. We quote: Pig Iron, 38 @ 48 florins ₱ ton; Merchant Iron, 105 @ 120; Sheets, 145 @ 175; do. Galvanized, 255 @ 315, and Beams, 115 @ 150. *Metals* have gradually become steadier at following quotations in florins ₱ 100 kg.: Copper, 100; Lead, 23; Spelter, 29; Tin, 200; Antimony, 56, and Quicksilver, 304.—*Handels' Journal.*

Helicoidal Elevator.—One of the interesting features of the Eiffel tower, at Paris, will be the ingenious elevator designed by M. Backman, and illustrated and described in the *Génie Civil.* The ordinary and well-known form of winding rope and cage was inadmissible, because not sufficiently safe for the hight of 1000 feet, hence the adoption of the Backman elevator, which consists really of a helicoidal railway on which runs a truck supporting the cage. The truck is revolved on the irons of the helicoid, and thus screws itself up or down, while the cage with the passengers, which is placed above the truck, is guided by vertical rods, and participates in the vertical, but not in the rotary movement. In virtue of the arrangements adopted the possibility of the cage descending by gravity alone is excluded, even if the driving rope should break. The elevator will be worked by a 120 horse-power steam engine.

GENERAL HARDWARE.

Trade continues moderate, with few changes in prices. The travelers of the leading jobbing houses are referred to as sending in a good many assorted orders, and the condition of the market is referred to as promising a fair season's trade.

BARB WIRE.

The market is quiet, with reports of offerings by Western mills at prices equivalent to 3.80¢ here for Galvanized Four-Point Barb Wire in carload lots.

The Thorn Wire Hedge Company, of Chicago, reorganized on January 1 under the name of Kelly Barb Wire Company, the name expressing the kind of Wire that they make. The business of the old company is being wound up by J. W. Calkins, president. The new company have removed their works to Deering Station, and Mr. Calkins will manage the business as heretofore. They will devote their attention principally to the manufacture of the Kelly Yielding Barb, which has become popular with farmers.

NAILS.

The New York market is fairly active, quite a number of dealers having placed orders. The New York agents of mills appear to be holding generally to the agreement by which store prices are fixed at $2.10 for small lots from store.

The Bellaire Nail Works, at Bellaire, Ohio, have made arrangements with H. K. Ross for the sale of their Nails.

WIRE NAILS.

Some of the leading manufacturers have been in conference and have reached an understanding with a view to securing improved prices for the goods. It was decided to hold the standard Nails at slightly advanced prices both for lots from store and in carloads. Somewhat reduced discounts were also determined on for the papered goods.

MISCELLANEOUS PRICES.

The trade will be interested in the description given on page 359 of the line of Spirally Welded Steel and Iron Tubing which is being put on the market by the Spiral Weld Tube Company, East Orange, N. J. The company issue the following price list, the prices given being per foot, without couplings. The list is subject to a discount of 50 per cent.:

Inside diameter. Inch.	Thickness of Stock by Birmingham Wire Gauge.						
	No. 20 0.035	No. 18 0.049	No. 16 0.065	No. 14 0.083	No. 12 0.109	No. 10 0.134	No. 8. 0.165
4.....	$0.48	$0.58	$0.68	.....	.....	.....	.....
5.....	0.59	0.69	0.79	.....	.....	.....	.....
6.....	0.68	0.80	0.9	$1.02	.....	.....	.....
7.....	0.76	0.91	1.16	1.25	.....	.....	.....
8.....	0.85	1.04	1.25	1.50	$2.10	.....	.....
10.....	1.05	1.31	1.52	1.90	2 4	$2.80	.....
12.....	1.28	1.56	1.90	2.30	2.80	3 20	$3.60
14.....	1.53	1.86	2.30	2.70	3.20	3.60	4.00
16.....	1.82	2.21	2.70	3.15	3.60	4.00	4.40
18.....	.....	2.56	3.10	3.55	4.0	4.40	4.80
20.....	.....	.....	3.45	3.95	4.40	4.80	5 20
22.....	.....	.....	3.80	4.35	4.80	5.20	5.60
24.....	.....	.....	4.15	4 80	5 20	5.60	6.00

The company are not yet prepared to furnish the largest sizes—namely, 18, 20, 22 and 24 inches—but expect to be in a position to do so in the near future.

The Hopkins & Dickinson Mfg. Company, Brooklyn, N. Y., announce, in a circular dated February 25, that owing to the continued high prices of Copper and other metals they are obliged to make an advance of about 10 per cent. on all goods that are sold at a discount, and that all net prices are withdrawn.

School Slates are irregular in price, and low quotations are made.

The condition of the Axe market is a little stronger that it has been, and the indications are that higher prices will be obtained by manufacturers during the coming season than prevailed during the past season. The large advance in Steel is the principal factor in advancing the price.

Advances are reported from week to week on such lines of Brass and Copper goods as have not heretofore been affected by the increased cost of the metals, and a good many other goods are made firmer in price even though no announcement is made of a definite advance.

There is more disposition on the part of manufacturers of Wood Planes to solicit orders, and the indications are that slightly better terms can be obtained by large buyers.

The market for Wrought-Iron Pipe is exceptionally quiet. Prices are irregular and low.

There are increasing indications of irregularities in the combination on Sand paper. Not only are small orders in some cases filled by manufacturers and their agents at the extreme rebate, but in some cases goods are obtained at still lower figures, in contravention of the terms of the agreement. The opinion is expressed that this condition of things is not likely to continue long and that the result may be the breaking up of the association. In the meantime it will be well for buyers of Sandpaper to be careful to secure the best terms they can.

The high price of Copper and other metals is having a depressing effect upon the trade of manufactured Brass and Copper, and one of the companies express themselves as looking for little improvement until speculators let go, and prices settle down to something like a normal condition.

Sargent & Co., New York and New Haven, Conn., are this week issuing, under date of February 1, a revised list of the Door Locks, &c., of their manufacture. The new list is subject to a discount of 50 and 2 per cent., with an additional 10 per cent. for prompt cash. In announcing these prices they are not followed by the other manufacturers, whose course is not yet determined. In the present condition of the market many Locks, especially the leading numbers, are sold at net prices, and there is a good deal of irregularity in discounts. It remains to be seen what the effect of this new list and discount may be, and whether it will call for a revision of prices by other Lock manufacturers.

ITEMS.

McIntosh, Huntington & Co., Cleveland, Ohio, have issued their illustrated circular of spring goods. It is a pamphlet of 28 pages. Shovels and Spades, Steel Goods, Pruning Tools, Sheep Shears,, Wheelbarrows and Curry Combs are, together with other seasonable specialties, given a prominent place. Circulars relating to Bird Cages, Sap Spouts, Extension Plumbs and Levels and Blair's Hog Ringers are also inclosed. A special circular relating to the tools of the E. Walker Tool Company, Erie, Pa., is also sent out, in which descriptions with list prices are given of their Adjustable Face Plane, Detachable Handled Chisels and Gouges, Micrometer Surface Gauge, Micrometer Marking Gauge and Cork Extractor.

Bigelow & Dowse, Boston, Mass., issue a 12-page circular, the greater part of which is occupied with the list prices of Withington & Cooley Mfg. Company's Steel and Wood Goods. Lawn Mowers and Lawn Rakes are also alluded to.

It will be seen from the Special Notice on page 60 that W. K. Morison & Co., Belfast, Me., offer their Hardware business for sale, giving at the same time some facts which indicate the desirability of the opportunity thus given to those wishing such an investment. It will be observed that the stock will be sold at market value for cash, and the fixtures at reasonable prices, without bonus. We are advised that the reason why the firm desire to dispose of what is referred to as a satisfactory and profitable business is the fact that Mr. Morison has made arrangements to purchase a large Hardware business in the Northwest, to which he desires to give his entire attention.

The American Cutlery Company, Chicago, Ill., have issued for their customers and the trade in general their annual catalogue for 1888. It gives illustrations of an exceptionally complete line of Table Cutlery, including Butcher Knives and case goods. A number of new and handsome designs have been added since the publication of their last catalogue, together with various kinds of Knives, making their present assortment very complete. In order to make this catalogue convenient and comprehensive all Knives are arranged in their proper classes, of which an index is given. The goods are thus classified under the main heads, Knives and Forks, Carvers, Steels, and Butcher and Miscellaneous, their being many subdivisions under these different heads. Handsomely colored representations are given of their cases of Cutlery, in which some fine goods are shown.

In connection with their pamphlet describing the Railroad Step-Ladder, Morley Bros., East Saginaw, Mich., issue a supplementary one containing additional letters from those who are using the Ladders, in which reference is made to their convenience and utility. Morley Bros. in a note to the trade state that they have now in use in their wholesale and retail department 24 Ladders and 900 feet of Rail, and since they first put them in more than five years ago they have not spent a dollar for repairs. They guarantee Ladders to do as well for others. The list of houses using these Ladders is an imposing one and includes many of the leading Hardware jobbers, as well as many retailers, indicating the utility of the Ladder for use in either wholesale or retail business.

The trade will observe the advertisement of the Francis Axe Company, Buffalo, N. Y., which occupies page 72 and represents some of the leading patterns of their well-known line. The intimation there given of the company's intention to advance prices April 1 deserves the attention of the trade, especially in view of the fact that the Axe market is giving indications of increased firmness.

Childs & Jones, Utica, N. Y., issue circulars relating to their improved apparatus for cheese factories, creameries and dairies. An extensive line of these goods is thus listed in a form that will be serviceable for those desiring such information. They also send out circulars relating to their Handy Set Tools for cutting and fitting Wrought-Iron Pipe, and also one describing the Adjustable Bar Spring Toothed Harrow, for which they have purchased the patent and sole right to manufacture and sell in the States of New York, Pennsylvania, New Jersey and Delaware and the New England States.

The Champion Iron Fence Company, Kenton, Ohio, issue a circular addressed to county officials in which reference is made to their facilities for supplying jail work. At the same time, they send out a postal card with a view to obtaining information as to work of this kind that is to be done in the near future.

Announcement is made by Mrs. A. E. Swift, J. R. Brigham and J. G. Parker that the copartnership of the firm of C. J. Swift & Co., Corry, Pa., having expired February 1 by limitation, they, the members of the above firm, having formed a new copartnership under the name of

Swift Hardware Company, will continue the business as heretofore, the only change being in the firm name.

John Miller and Chas. T. Carter, having secured the old hardware stand—established 1800—606 Pennsylvania avenue and 607 B street, N. W., Washington, D. C., formerly occupied by L. C. Campbell and afterwards by J. W. Kennedy & Co., advise us that they will carry on the business with a complete stock of Builders' and General Hardware, together with Tin Plate and Cabinet Supplies, under the firm name of C. T. Carter & Co. They state that they will be pleased to hear from manufacturers and wholesale dealers in these lines of goods.

The trade will observe the announcement on page 60 in which attention is called to Leigh's Discount Book and the publication of a new edition announced, concerning which some information is given.

The Emery Mfg. Company, Minneapolis, Minn., issue a small pamphlet relating to their Eclipse Ventilator and Emery's Patent Swivel and Flexible Grain and Coal Chute.

An opportunity to purchase an established wholesale and retail hardware business is referred to in the advertisement signed E. C. B., page 39. The business in question is in a city of 25,000 inhabitants, and it is stated that last year with only one traveling salesman a business amounting to $100,000 was easily done, and it is intimated that the trade can easily be increased. Particulars in regard to the opportunity, the amount of stock, extent of establishment, &c., are referred to in the advertisement.

Announcement is made, New York, February 14, by Charles W. Leng and James B. Pratt, general partners, and Mary S. Leng, special partner, that they will continue at No. 4 Fletcher street, in the city of New York, under the style of John S. Leng's Son & Co., the business heretofore carried on at that place by the late John S. Leng.

We learn from a Hardware exporting house that a lot of Sheffield Knives shipped by them to a buyer in South America have been siezed by the Liverpool custom authorities under the English Merchandise Marks act. Instances of this kind are multiplying, and in the future exporters would do well to see that the markings on their goods conform to the English law, unless they care to run the chances of confiscation.

Riehlé Bros., Philadelphia, Pa., manufacturers of Scales and Testing Machines, have removed to the large warehouse, 413 Market street, where, in addition to their stock of Scales, they will carry a varied and extensive line of special Hardware novelties, and also an assortment of Railway and Contractor's Supplies.

Seymour, Smith & Co., Oakville, Conn., are putting on the market for the coming season a new pattern of Pruning Shears, their No. 5, which is similar in design to their No. 3, but is operated with a coiled spring.

The advertisement of the Syracuse Forging and Gun Company, Syracuse, N. Y., will be observed on page 15. Their Baker Gun is regarded by the manufacturers as especially adapted to the demand of the Hardware trade on account of its poise, finish and shooting qualities. It is made in but one style, 10 and 12 gauge and 7½ to 11 pounds weight.

In a paragraph in our last issue Silver & Co.'s Egg Beater was erroneously referred to instead of their Egg Poacher. The correct statement is that in their suit against George E. Lockwood to sustain the validity of their Egg Poacher patent of November 3, 1885, decision has recently been rendered in their favor, adjudging that their title to said patent is good, and ordering a permanent injunction against the defendant.

Orr & Lockett, Hardware merchants, at 184 Clark street, Chicago, are furnishing all the Hardware for the great Rookery Building, on La Salle street, Chicago, which is one of the largest office buildings in the United States. This Hardware is of special design, according to the plans of Burnham & Root, the architects of the building, acting under the advice and suggestions of Orr & Lockett. It is also of unique construction, being made entirely of Cast Iron which has been Bower-Barffed. The manufacturers of the Hardware are the Yale & Towne Mfg. Company, of Stamford, Conn. Orr & Lockett have had a great deal of experience in furnishing Hardware to large buildings, as nearly all the principal buildings of Chicago erected in recent years have been supplied by them. One office building which was completed not long since was furnished by them throughout with Hardware of special design, for which an extra price was paid to insure its non-duplication for any other structure.

The trade will observe the effective illustration on page 87, which is made by the Miller Lock Company, Philadelphia, of some of their leading goods, including their Champion Six-Lever Padlocks, in regard to the prices of which information is also given.

The Farm Implement and Vehicle Association, St. Louis, at their last monthly meeting elected the following officers for the ensuing year: L. B. Tibbitts, president; D. W. Haydock, first vice-president; H. G. Ellis, second vice-president; H. L. Whitman, third vice-president; George K. Oyler, secretary, and W. T. Haydock, treasurer.

A new Chamois Leather Cloth has recently been put on the market in England. It is described as a textile fabric, manufactured in such a way that it possesses the qualities of Chamois Leather, both in feel and wear, and besides remains soft after washing. Its superiority over Chamois Leather for many uses is referred to, and its adaptation for cleaning Plate Glass, Copper, and other metals is alluded to. The fact that it is furnished at a considerably lower price is also of interest.

Jesse Jones & Co., 615 Commerce street, Philadelphia, Pa., issue a circular describing the Wooden Shelf Boxes of which they are manufacturers, and giving a number of letters from Hardware houses who are using them. From their description of these Boxes we make the following condensed description, which will indicate their construction, finish, &c.:

The Boxes are made of well-seasoned hard poplar wood 5-16 thick. The corners are locked and bottoms grooved in. The bottoms cannot come out unless broken. When the Boxes are used singly on the shelves we set the bottom up 1-16 inch, leaving the sides to act as runners. Where two or more are used on the same shelf we set the bottom flush with the sides. For Screws or small goods they can be divided into two or more parts with movable partitions grooved and set in the sides. Partitions can be taken out at any time, leaving the Box full size. They are made to fit snugly all around and used without lids. They look well varnished or they can be stained. We usually finish one end in light-green glazed paper. We have fitted up several stores with 500 to 1500 Boxes at an average cost of about 12 cents.

They also make a pattern of Box the outer end of which is made in what they term Drawer style, the front of which presents an unbroken surface, the sides not appearing in view. This pattern, they advise us, though more expensive than the regular style, is in some demand, being more suitable for staining.

TRADE TOPICS.

An agreement has recently been reached by the Hardware and Agricultural dealers in Boston, that hereafter charges shall invariably be made for case and carting. Announcement of this is made in the following form with the signatures appended:

On and after February 1, 1888, we shall make a charge on all our bills that will cover the cost of cases and drayage.

DANA HARDWARE COMPANY,
By OTIS D. DANA, Treasurer.
BIGELOW & DOWSE.
BROOKS, BALDWIN & ROBBINS.
FRYE, PHIPPS & CO.
BURDITT & WILLIAMS.
BOLLES, KIMBALL & WILDE.
THE YALE & TOWNE MFG. COMPANY,
A. T. YOUNG, Manager.
CUTLER, WOODROUGH & CO.
JOSEPH BRECK & SONS.
PARKER & WOOD.
C. H. THOMPSON & CO.

We learn that there has been a similar movement in Portland, Me., and that the Hardware dealers of that city have signed an agreemeut to the same effect. The following houses are mentioned as uniting in this measure:

EMERY, WATERHOUSE & CO.
SMITH, TIBBETTS & CO.
N. M. PERKINS & CO.
EDWARDS & WALKER.

In the following remarks in regard to Tacks and the manner of their putting up, our correspondent expresses, it will be seen, a preference for the prevailing method, but calls upon manufacturers to discontinue the practice of putting up short weights:

I would prefer present arrangement—that is, Full, Half or Quarter Weights and nothing else. Try anything else and you will get what you buy, and no dealer can tell what to figure on in competition with his neighbor. If I can read the signs there is more kicking about short weights than the classification. Let the manufacturers be as honest in putting up their goods as they want their customers to be in paying for them, and there will be a good deal less trouble all around.

A Hardware house on the Pacific Coast writes with reference to the significance of the term cash. They mention that recently they bought a bill of goods from a manufacturer in Pennsylvania on which there was a shortage of some $15, the bill being paid before the receipt of the goods, in accordance with their usual custom, that they might get the customary discount of 3 per cent. The manufacturer in the meantime failed, and they accordingly had no recourse. On mentioning the fact to a jobber he assured him that it was not necessary to pay in advance, as the discount for cash supposes payment after receipt of goods. Their inquiry is as to whether a discount for cash requires payment on receipt of the invoice or on receipt of the goods, and on this point they would like some of our readers, especially those having dealings with far Western houses, to express through our columns their understanding of the force of the term.

As bearing upon this question we give below a circular issued by the Bed Rock Works, Bainbridge, N. Y., in which their understanding of significance of the term spot cash is explained. It will be seen that this term is understood as calling for the payment of invoice as soon as received:

"Spot cash" means cash on the spot, soon as transaction is closed.

When we deliver goods to the railroad company, as ordered by our customer, and send shipping receipt and invoice, payment is due to us.

It makes no difference if goods are delayed by railroad company, you pay the freight and the railroad company work as your carrier; their delay is none of our affair or fault.

You might order goods sent via Hong Kong, or any way you like. We ship as ordered, but our pay is due when you receive our invoice by mail. If you want to wait for arrival and trial of goods before you pay for them, say so when you order and pay the extra charges we make to such customers.

We sell first-class goods at very low prices for spot cash, and at a slight advance on 30 days, but we do not sell goods at spot cash rates on customer's own terms.

As bearing on the same question we have the following letter, in which the same matter is discussed·

A customer who writes upon a stylish letter-head, in disputing about the term spot cash, says:

"We understand spot cash to mean cash as soon as we have received the goods and examine them."

But suppose the customer is in China, and the goods are six months in reaching him; are we, as shippers, to wait six months? And suppose, again, the goods are shipwrecked and the customer has not insured them; must we insure them or run the risk of losing our pay altogether? Has spot cash a meaning? If so, what does it mean?

First, we had Terms Cash. Then 2, 3 or 5 per cent. for cash—in other words, 2, 3 or 5 per cent., or some other bribe, to get people to do as they agreed. Next, we had Net Cash, to show that cash in its original sense was expected without any bribe or abatement, and last we have Spot Cash, but it don't avail. What is the remedy? Will it have to be Cash in advance?

INDIAN VS. SISAL HEMP.

The following article in regard to the Sisal Hemp market and the effort of the English manufacturers to find some substitute for it will be of interest:

The pressure of competition, both at home and abroad, is compelling Flax spinners to search for new fibers to take the place of those used in the manufacture of Twine and Cordage. Their aim is to discover the cheapest possible material from which ordinary Shop Twines and Cord for packing purposes can be made. Hemp, Jute and Tow are manipulated and finished in a variety of ways, by which their general appearance is made to resemble that of Flax, and so long as a fairly marketable article leaving a good profit is produced the object of the manufacturer, and, for the matter of that, of the merchant, is attained. Much of the poor Twine now in the market has really been produced at the suggestion of the merchant, who must have an article at a certain price if he is to compete with the foreign producer, and hence makers are constantly on the *qui vive* for something even cheaper than Tow; and when the cheap fiber is obtained they show the greatest possible ingenuity in devising machinery for spinning and finishing it. Indian Hemp is one of the latest additions to the list of fibers, and with this certain Flax spinners are now experimenting, with a view to produce from it a merchantable Twine, cheap Ropes and Cordage. One great obstacle at present staring the Twine-maker in the face is the scarcity of Sisal Hemp, and it is hoped that Indian Hemp will eventually be supplied as substitute, in which case the American manufacturers who are buying up Sisal will probably be undersold. It is to be hoped that the effort to utilize the Indian product will succeed, for in that case another important source of revenue will be opened to the agriculturists of India. The quantity of String used for sheaf-binding harvesters is enormous, and grows from year to year, especially in the United States and in Australia. Hitherto such String has been made chiefly from Sisal Hemp; but with the demand for this on the part of America the future supply from this country will be made either of Indian Hemp or of Jute. The last-named fiber is already largely used for sheaf-binder Twine, manufactured at Dundee, and will hold its ground until a cheaper article is discovered.

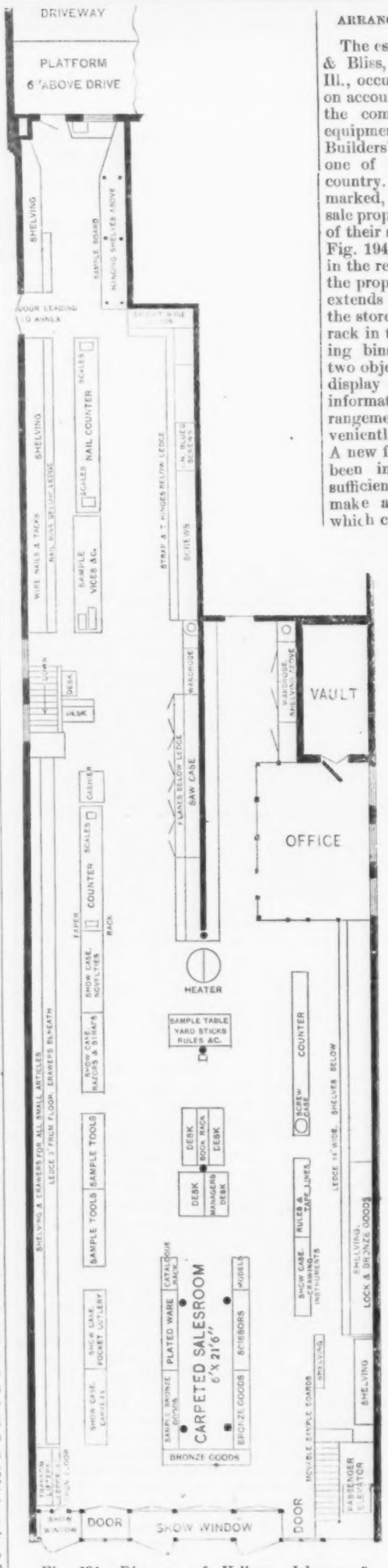


Fig. 194.—Diagram of Kellogg, Johnson & Bliss's Store.

ARRANGEMENT OF HARDWARE STORES.

The establishment of Kellogg, Johnson & Bliss, 108 Randolph street, Chicago, Ill., occupies a high position in the trade on account of the extent of the stock and the completeness and excellence of its equipment. The firm make a specialty of Builders' Hardware, of which they carry one of the largest assortments in the country. As one of the firm jocularly remarked, they do a retail business of wholesale proportions. The general arrangement of their store is indicated in the diagram, Fig. 194, which, however, omits an annex in the rear to which reference is made in the proper place in the plan. This annex extends 70 feet alongside the rear end of the store with shelves on the sides and a rack in the center for Chain spools, packing bins, &c. In arranging their store, two objects have been kept in view—the display of a full line of samples for the information of their customers, and the arrangement of the stock so that it may be conveniently accessible for filling small orders. A new feature of the store, which has just been introduced, is the inclosure of a sufficiently large part of the front space to make a special salesroom, Fig. 195, in which customers can seat themselves and at their convenience make selections of Hardware. This has been rendered almost necessary by the interest which ladies are taking in the matter of house decorations, which extends even to the hardware to be used in their new houses. This inclosure, which is neatly carpeted and furnished with chairs, tables, &c., is formed by arranging the counters and show-cases containing Bronze Goods, Plated Ware and other high class stock around three sides of an oblong square. The show-cases face outward along roomy aisles which are left on the sides for the passage of customers to the different parts of the store. The entrance to this salesroom, as indicated in the cut, is at the rear. Under the show-cases are drawers containing samples of the goods which are most likely to be called for by the class of customers using the special salesroom. As far as possible, these samples are arranged on boards which are as large as the drawers will admit of and which can be easily taken out for inspection and returned. For the purpose of showing fine Door Locks to advantage an original plan has been devised, which has been deemed worthy of illustration, Fig. 196. A full set is fastened on a board about 2 feet square, as shown in the cut herewith, having another board about 5 inches high secured to one end of it, the whole resembling a drawer with three sides off. A drawer pull is screwed on the front of the upright board and a cabinet, Fig. 197, has been made which will hold a number of the lock boards, so that they slide in and out like drawers. The advantage of their use is that a customer can see at a glance all the trimmings of a Lock, even including the keys, and can therefore act more intelligently in making a selection, while the parts of several Locks do not get mixed up as they would if they were taken out of the original papers and spread upon a table or counter. This cabinet for samples of Lock sets is of small size, being intended only for the finest Locks. It has 10 slides,

arranged in two vertical rows of five each. The cabinet is made of oak, stands 23 inches high and each side is 23 inches wide, the slides or boards being 20½ inches long by 15 inches wide, and the front piece or upright on which the drawer pull is fastened is 3½ inches high. A small plate is screwed on the front of each slide bearing the number of the lock sampled within, and the drawer pull is fastened below the plate as the sketch indicates.

In different parts of the store ingenious arrangements have been made for the purpose of facilitating the examination of samples while preventing the mixing of various sizes in the stock. For instance, a sample of every kind of file kept is exposed on a board to which they are securely fastened. The files are then numbered in regular order. The stock drawers are numbered to correspond, and the consequence is that an inexperienced clerk, unacquainted with the names of the different kinds of files, cannot fail to get exactly what the customer has selected from the sample board. These sample boards are in themselves worthy of special mention. They are about 2 feet long by 1½ feet plain ones together; one has escutcheons, one has harness and clothes-line hooks and hammock hooks, and three have wardrobe or clothes hooks. The second row is entirely devoted to hinges, all eight boards.

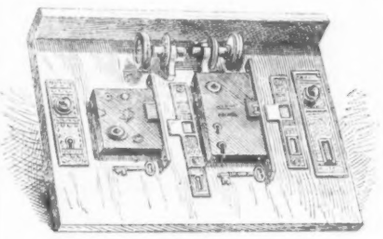


Fig. 196.—Sample Drawer.

The lowest row is used as follows: One board has window-screen corners and bracket hooks; two have door springs; one has brass towel racks; two have door bolts, and two have sash and other boxed pulleys. All these samples are screwed on, if it is practicable to so fasten them, otherwise they are secured in place with small

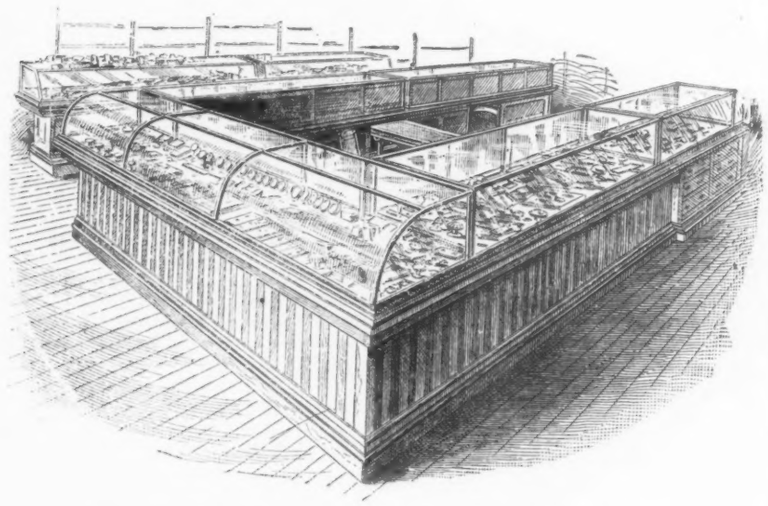


Fig. 195.—Arrangement of Counters, Giving Special Sales Room.

wide, painted green, and are fastened by hinges at one side to the uprights supporting the shelves as shown in Fig. 198. Swinging either way, they obstruct nothing, but on the contrary add much room to the store for the display of samples. The sample boards are placed at a convenient hight from the floor for the inspection of customers.

Sample boards which are placed in drawers are a feature also which deserves mention. Each board has samples fastened all over one side of it, the boards being made a little smaller than the drawers so that they can be easily removed. The drawers containing these sample boards are not used for anything else.

Sample boards attached to wall are shown in Fig. 199. They are 32 inches long and 20 inches wide, made of inch pine boards, painted green. They are fastened in three tiers of eight boards each. They are held in place by buttons, two to each board. The buttons are screwed on strips 2 inches wide, extending the full length of a row of boards, and an inch thick, so that they come flush with the tops of the sample boards. The buttons are at the tops of the boards only, no other fastening being needed to hold them in place. An ornamental molding runs along the top strip. The boards are not separated from each other by any vertical strips. The top row of boards is filled with samples as follows: Three have drawer pulls, the ornamental brasses being together, and the cheap and staples. Price cards are tacked near them, usually ¾ inch disks of white cardboard.

The space above these sample boards has a full line of shelf brackets arranged in a horizontal row, fastened with staples, but not movable. Plain and ornamental patterns are thus shown in every size.

The stairway leading to the upper stories is cut off from the store by a partition,

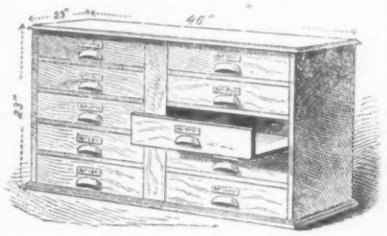


Fig. 197.—Sample Cabinet.

which is thus used for exposing samples. The space under the stairway is reached by a doorway at the end, the interior being shelved and stocked with brackets and a number of other goods sampled on the partition. Bolts are stored in compartments extending under the steps, short bolts being at the top where the steps are close, and long bolts being at the bottom, running out under the lowest steps and utilizing space that would otherwise not be used. This stairway closet is a fair sample of the method pursued throughout the whole store of putting every inch of space to use in some way.

The cellar, which extends under the whole store, is of good hight, floored with boards and free from dampness. While no bright goods are kept there, all bulky articles, such as nails, wire cloth, rope, &c., are stored in an orderly and conveniently accessible manner.

The central cashier system of making change which is used in large dry-goods

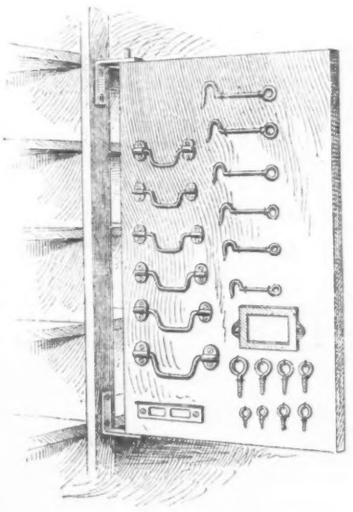


Fig. 198.—Swinging Sample Board.

stores has lately been introduced by this firm. Overhead wires connect the various counters with the cashier's desk, and little boxes travel back and forth with money and change. In order to accommodate their immense stock the shelving in all cases extends to the ceiling and Morley's sliding or railroad ladders are used in all parts of the store. The proprietors evidently believe in displaying their goods as completely and as effectively as possible, and hence they have an unusual number of fancy counter showcases, and resort to different devices for the sampling of the goods handled. An unusual number of drawers are to be seen in the store, the effort being made to keep the stock as far as possible in this way so as to prevent it

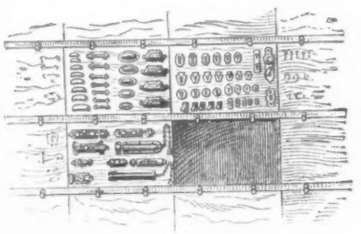


Fig. 199.—Sample Boards.

getting soiled, the heavy retail trade of the firm compelling open packages to be in constant use. Where shelves are used under counters, sliding doors are fitted in front of them to keep out the dirt. A description of the method employed in caring for catalogues, price lists, &c., is deferred until our next issue.

SALESMEN'S EXPENSES.

From one of our exchanges we make the following extract in regard to the legitimate traveling expenses of salesmen:

In the minds of many young travelers there appears to be a lack of clearness as to what expenditures are properly chargeable to their employers. Perhaps this vagueness in the head is not confined to young travelers, but

they at least have a right to be informed both as to the customs of the road and the whys and wherefores thereof. The object in paying a traveler's expenses is not to relieve him of all the costs and charges to which he may be accustomed to indulge at home. His tastes and habits are not assumed by the firm, nor are his employers bound to provide him with recreation or amusement. Every expense made directly in the interest of the house is chargeable to the house. All fares, freights, express, excess baggage, cartage, porterage, postage, telegraphing, stationery, &c., are of this class. It not infrequently happens that the interest of the house can be furthered by some quite unusual outlay. The means of dissipation are no part of an employer's provision for a traveler. About treating customers there are rather various opinions. We don't believe in bribery of any sort, and have small respect for a merchant or buyer who can be wheedled into buying goods by the persuasive power of smoke or drink. We have known some who were. Undoubtedly the use of these elements has promoted some trades, but the novice who thinks he can further his connection by an indiscriminate bestowal of these attractions will get "left." The attempt to bribe is too plain and is resented, as it ought to be. Quite different from this, however, are the trifling interchanges between buyer and seller who know each other's tastes to be congenial, and such courtesies often ease the revolutions of business and are properly chargeable thereto.

SAN FRANCISCO TRADE.

The following statistical review of the business in Agricultural Implements, Hardware and Metals in San Francisco the latter half of 1887 will be of interest, and the extent of the trade and the prospects for its still further increase will be noted with satisfaction:

There never was a more prosperous period in the San Francisco Agricultural Implements, Hardware and Metal market than during the latter half of 1887. The increase in Hardware and Agricultural Implements cannot be given at less than 15 per cent. Prices on the whole improved toward the close of the year. The Quicksilver trade was the best in a long time. A heavy advance was made in prices, and as a sort of phenomenon we shipped during the close of the year largely to China. Tin and Tin Plate, the former especially, advanced on account of the manipulations of the foreign syndicate. Copper also advanced heavily, rendering the working of the coast mines profitable. There was, too, an advance in Lead. The Nail trade was quite prosperous, as may be seen by the data given. The wonderful increase in imports of Scrap Iron and Steel is shown by the data as to foreign imports. They indicate a great advance in the matter of Iron and Steel manufactures. The year as a whole was a good one, while 1888 promises to be much better than was its predecessor.

Agricultural Implements.

Imports in—	Pounds.
1884	15,300,890
1885	12,661,000
1886	11,999,310
1887	16,722,320

These figures show an increase. During the early part of 1887 the business was rather slack, as it was generally deemed certain that our crops would be the shortest in our history. It turned out, however, that they were fair, and business prospered much better than anticipated. Our local factories in this city, at Benicia, Stockton and elsewhere all report a growing demand and increasing sales for their goods, which are yearly becoming better suited to the needs of our farmers. The heavy rains of this season insure a great demand for 1888.

Old Metals, Rags, &c.

The purchasing prices offered by dealers are as follows:

Heavy Copper	₱ lb	$0.10 @	$0.12
Light Copper	₱ lb,	..... @	.09
Copper Bottoms	₱ lb,	..... @	.09
Brass, Heavy	₱ lb,	..... @	.08½
Brass, Light	₱ lb,	..... @	.06½
Composition	₱ lb,	.0.12 @	.12
Lead, Heavy	₱ lb,	.03¾ @	.04½
Tea Lead	₱ lb,	..... @	.04
Zinc	₱ lb,	.03 @	.03¼
Wrought Iron	₱ ton,	18.00 @	.....
Light Iron	₱ ton,	10.00 @	.....
Stove Plate Iron	₱ ton,	10.00 @	.....
Machinery Iron	₱ ton,	13.00 @	13.50
Grate Bars	₱ ton	..... @	7.00
Old Rubber	₱ lb.	.04½ @	.05½
White No. 1	₱ lb,	.03¾ @	.03¾
White No. 2	₱ lb,	.01¾ @	.01¾
Canvas, Linen, No. 1	₱ lb,	.04 @	.04½
Canvas, Cotton, No. 1	₱ lb,	.04⅜ @	.04½
Canvas, No. 2	₱ lb,	.02⅜ @	.02½
Seconds	₱ lb,	.01 @	.01⅛
Soft Woolens	₱ lb,	.06½ @	.07
Mixed Rags	₱ lb,	.01 @	.01¼
Bunny Bagging, No. 1	₱ lb,	.02½ @	.02¼
Jute Butts	₱ lb,	.02½ @	.02⅝
Book Stock	₱ lb,	.01 @	.01⅛
Newspapers	₱ lb,	.00¾ @	.01
Waste Paper	₱ lb,	.00¼ @	.00½
Hemp Twine	₱ lb,	.02½ @	.03
Sisil Baling Rope	₱ lb.	..... @	.03

Imports.

The imports of Iron and Steel, Hardware, &c., at this port from February 20 to February 27, inclusive, and from January 1 to February 27, inclusive, were as follows:

	Feb. 20 to Feb. 27. Tons.	Jan. 1 to Feb. 27. Tons.
Iron Ore: Ennis & Co	1,021	1,021
Naylor & Co	364	713
A. Earnshaw	698	2,436
Pig Iron: G. W. Stetson & Co	650	3,150
Crocker Bros	300	1,800
Jas. Williamson & Co	100	1,000
Henderson Bros	10	410
N. S. Bartlett	100	1,300
Spiegeleisen: J. A. Jansen	1,230	6,582
C. L. Perkins	1,000	1,000
Crocker Bros	262	346
Dana & Co	51	101
Steel: W. F. Wagner	30	211
R. H. Wolff & Co	15	106
C. F. Boker	10	17
F. S. Pilditch	8	50
M. Cohn	7	49
Chas. Hugill	7	57
C. W. Power	5	8
Steel Rods: S. A. Galpin	250	710
R. H. Wolff & Co	161	785
J. A. Roebling's Sons	100	348
R. F. Downing & Co	11	27
Steel Billets: J. Manas & Son	10	10
Steel Forgings: Thos. Prosser & Son	257	971
Steel Hoops: Bullard & W.	100	350
Steel Sheets: R. Crooks & Co	17	17
Lalance & G. Mfg. Company	18	102
C. S. Mersick & Co	17	22
Pierson & Co	12	184
Steel Nail Rods: J. Abbott & Co.	30	30
Steel Tubes: R. F. Downing & Co	3	3
Rivet Rods: J. Abbott & Co	121	377
Iron Bars: J. Abbott & Co	2	2
Iron Screw Rods: American Screw Company	121	121
Iron Rods: R. H Wolff & Co	75	125
Scrap Iron: W. H. Crossman & Bro	47	47
Iron Beams: R. F. Downing & Co	60	170
Tee Iron: C. F. G. Chase	12	12
Sheet Iron: T. B. Coddington & Co	18	272

Tin Plates.

	Boxes.	Boxes.
Pratt Mfg. Co	6,335	39,909
Phelps, Dodge & Co	8,412	65,273
N. L. Cort & Co	3,580	19,389
T. B. Coddington & Co	1,603	23,861
Dickerson, Van Duzen & Co	2,451	47,115
Hy. Whittemore & Co	3,419	8 163
H. R. De Milt & Co	842	2,493
W. A. Potts' Son & Co	573	573
C. S. Mersick & Co	225	1,731
N. & G. Taylor	150	150
A. A. Thomsen & Co	59	27,060
American Metal Company	128	128

Metals.

	Pounds.	Pounds.
Tin: J. Abbott & Co	1,466,555	2,624,937
Hendricks Bros	33,461	158,057
Muller, Schall & Co	22,386	22,386
American Metal Company	15,740	248,620
Nickel: McCoy & Sanders	5,000	30,680
Spelter: American Metal Co	55,092	221,241
	Casks.	Casks.
Antimony: Phelps, Dodge & Co.	50	220

Hardware, Machinery, &c.

Burkinshaw, W. B., Hdw., cs., 2
Baldwin & Gleason Co., Mch'y, case, 1
Boker, Hermann & Co., Mdse., cs., 32; Anvils, 180
Castle, G. A. & Co., Hdw., cs., 2
Congdon, C. W., Hdw., case, 1
Dieckerhoff, Raffloer & Co., Hdw., cs., 2
Folsom, H. & D., Arms, cs., 11
Frank E. Eschwege, Hdw., cs., 15
Field, Alfred & Co., Mdse., cs., 7; Anvils, 156
Funch, Edye & Co., Hdw., cs., 2
Gurney, F. B., Cutlery, cs., 6
Hanson, C. A., Mach'y, cs., 9
Heymann, N. H., Mach'y, case, 1
Helmuth's Sons, Chas., Mach'y, cs., 5
Hammacher, Schlemmer & Co., Nails, cs., 3
Hoffmann & Ochmenger, Nails, cs., 22
Junge, F. W. & Co., Mdse., cs., 6
Kamak, B. & Co., Cutlery, cs., 3
Korting Company, Mach'y, cs., 8
Lau, J. H. & Co., Arms, cs., 5
Morris, L. W. & Son, Mach'y, case, 1
Merchants' Desp. Co., Chains, cks., 16
Newton & Shipman, Files, cask., 1
Pennsylvania R. R. Co., Hdw., case, 1
Perry & Ryer, Copper Wire, cs., 9
Pratt & Farmer, Hdw., cs., 10
Rotterdam S. S. Co.'s agent, Arms, cs., 4
Roy, J. & Co., Mach'y, case, 1
Rathbun, W. L. & Co., Chains, cks., 6
Salt, A. L., Tools, case, 1
Schoverling, A., Mdse., cs., 18
Schoverling, Daly & Gales, Mdse., cs., 4
Sellers, W. B., Mdse., cs., 3
Shattuck & Binger, Mdse., cs., 3
Sheldon, G. W. & Co., Mach'y, pkgs., 247
Taylor, Thos., Hdw., cs., 9
Thornton, J. & Co., Hdw., cs., 4
Vom Cleff & Co., Mdse., 3
Waefelaer, Louis, Nails, kegs, 81
Wiebusch & Hilger, Lim., Mdse., cs., 19; Hdw., cs., 2; Chains, cks., 25
Ward, Asline, Cutlery, cs., 5
Witte, John G. & Bro., Cutlery, cs., 33
Order: Mach'y, cs., 14; Files, cks., 6; Hdw., cks., 10; do., cs., 2

Irons and Metals Warehoused from February 20 to February 24, inclusive: Tons.

Steel Rods:	Naylor & Co	610
Scrap Iron:	Jas. E. Ward & Co	77

Exports of Metals.

	Feb. 20 to Feb. 27. Pounds.	Jan. 1 to Feb. 27. Pounds.
Copper: J. Abbott & Co	149,250	3,055,359
Lewisohn Bros	336,102	1,382,062
American Metal Company	22,780	1,292,901
G. H. Nichols		111,116
J. Bruce Ismay		112,000
F. A. Lomal		2,481,000
S. Mendel		560,000
Ledoux & Co		2,100
Phelps, Dodge & Co		230 664
Muller, Schall & Co		225,000
Copper Queen Con. M. Co		224,034
J. Kennedy, Tod & Co		112,026
H. Becker & Co		1,250
Orford C. & S. Rfg. Co		224,881
Robt. M. Thompson		125,000
Thos. J. Pope, Sons & Co		115,000
J. Parsons & Co		67,500
Copper Matte: Williams & Terhune	599,450	13,131,108
American Metal Company	22,400	383,975
Lewisohn Bros	225,000	2225,000
J. Abbott & Co	295,000	295,000
C. Ledoux & Co		386,520
Old Copper: Burgass & Co	43,008	156,365
Old Brass: Burgass & Co	8,036	53,500

Paints and Oils.

Paints.

Black, Lamp—Coach Painters'	₱ lb 22 @ 24¢
" Ordinary	6¢
Black, Ivory Drop, fair	12 @ 15¢
" " best	23¢
Black Paint, in oil—kegs, 8¢; assorted cans, 11¢	
Blue, Prussian, fair to best	40 @ 55¢
" " in oil	45 @ 55¢
" Chinese dry	70¢
" Ultramarine	18 @ 30¢
Brown, Spanish	1¼¢
" Van Dyke	10 @ 12¢
Dryers, Patent American—ass'd cans, 9¢; kegs, 7¢	
Green, Chrome	15 @ 23¢
Green, Chrome in oil	14 @ 18 @ 25¢
Green, Paris	good, 20¢; best, 25¢
Green, Paris in oil	good, 30¢; best, 35¢
Iron Paint, Bright Red	₱ lb 2½¢
Iron Paint, Brown	₱ lb 1½¢
Iron Paint, Purple	₱ lb 3¢
Iron Paint, Ground in oil, Bright Red	₱ lb 6½¢
Iron Paint, Ground in oil, Red	₱ lb 5½¢
Iron Paint, Ground in oil, Brown	₱ lb 5½¢
Iron Paint, Ground, Purple	₱ lb 6¢
Litharge	6½¢
Mineral Paints	2 @ 4¢
Orange Mineral	10¢
Red Lead, American	6½¢
Red Venetian (Eng.) dry	$1.65 @ $1.70
Red Venetian in oil	ass't'd cans, 11¢; kegs, 8¢
Red Indian Dry	9 @ 12¢
Rose Pink	10 @ 13¢
Sienna, American Raw, powdered	4¢
Sienna, Burnt, powdered	4½¢
Sienna, Burnt, in oil	10 @ 16 @ 20¢
Sienna, Raw	11 @ 15 @ 25¢
Umber, Burnt, powdered	4 @ 8¢
Umber, Burnt, in oil	9 @ 12 @ 15¢
Umber, Raw, powdered	4 @ 7½¢
Umber, Raw, in oil	9 @ 12 @ 15¢
Vermillion, Chinese	90¢
Vermillion, English	70 @ 71¢
Vermillion, American Common	15¢
White Lead, American pure dry	6¢
White Lead, American pure dry, in oil	7 @ 7½¢
White Paris, English Prime	2 @ 2½¢
Yellow Ocher, French	$1.75
Yellow Ocher, French, in oil	ass't'd cans, 11¢; kegs, 8¢
Yellow Ocher, Vermont	in casks, 1½¢
Yellow Chrome	17 @ 27¢
Yellow Chrome, in oil	14 @ 18 @ 25¢
Zinc White, American No. 1, dry	5 @ 6¢
Zinc White, American No. 1, in oil	9¢
Zinc White, French (Paris Dry)	6¾ @ 7¾¢
Zinc White, French, in oil	10 @ 11¢

Oils.

Bleached Whale, ₱ gal	44¢
Bleached Sperm, ₱ gal	67 @ 75¢
Fish Oil, Pressed	28¢
Lard, Prime, present make	62½ @ 65¢
Cylinder Oil	70¢
Machinery	45¢
Engine	55¢
Linseed, Raw, in casks and bbls	56 @ 59¢
Linseed, Boiled, in casks and bbls	60 @ 63¢
Neatsfoot	80 @ 90¢
Cotton Seed, Refined	41 @ 44¢

Hammock and Clothes-Line Holder.

The Phillips & Getman Company, Ilion, N. Y., are manufacturing the holder for hammocks and clothes-lines which is illustrated in the accompanying cut. This

Hammock and Clothes-Line Holder.

holder, as shown in the cut, is made in two pieces, one piece with hook to be fastened to the post or other object, and the ring attached to the rope, there being a smaller ring which fits on the hook. On the inside of the hook there is a projection, shown in the cut, which is a guard against unintentional slipping off of the ring, making the hook exceptionally secure. The strength of this holder and its convenience, together with the fact that it prevents wearing the rope, are points made by the company in regard to it.

Eagle Sharp Spur Trimming Knife.

E. S. & F. Bateman, Spring Mills, N. J., in their catalogue recently issued, illustrate the trimming knife shown in the accompanying cut. It is intended for cut-

The Eagle Sharp Spur Trimming Knife.

ting, clipping and clawing out berry canes, dead-wood, briers, tree sprouts, sweet-potato vines, &c. The handles and blades are about 4 feet long, and the weight of the tool about 2 pounds. The tool proper is made of cast steel drop-forged. The point is emphasized that it cuts and removes by push or draw motion, and that with it danger is avoided of pulling out the roots of berry canes, &c., as often happens with other draw-hooks. Application has been made for a patent on this tool.

Reed's Folding Boxes.

H. T. Reed, 78 State street, Chicago, is putting on the market a new style of tin cash and deed boxes, for which a patent is pending. The illustrations herewith given represent the cash box open and closed. The deed box differs from the

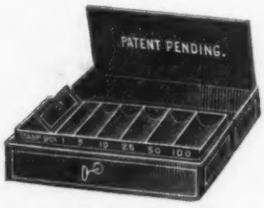


Fig. 1.—Cash-Box Open.

cash box only in the tray. The boxes are of one size, namely 9¼ inches long, 4½ inches wide, and 4⅝ inches high. The cash-box tray has compartments for silver dollars, halves, quarters, dimes, nickels, cents, and a box for postage stamps, which can be used for gold coin. Under the tray is a compartment for checks, drafts, money orders, &c. The top half of the box forms a large compartment, with a lid which is shown open, for paper money. The deed-box tray has the stamp box at the end, but the rest of the space is thrown into one large compartment for papers. These boxes are used by merchants, cashiers, collectors, secretaries of lodges and other associations, and others. They are handsomely ornamented and enameled inside and out, and furnished with a substantial lock. The cut of the

Fig. 2.—Cash-Box Closed.

box as closed shows its compactness when the lids are folded and the box is ready to be put away.

Monitor Frame Pulley.

The Palmer Hardware Mfg. Company, Troy, N. Y., are putting on the market the Monitor Frame Pulley which is represented in the accompanying illustrations, Fig. 1 giving a general view of the pulley and Fig. 2 showing the mortise into which it fits. It will be perceived that in general form this pulley is not materially different from certain styles made of cast iron now in the market. It has holes in the ends of the cases through which to drive the brads to fasten it in the mortise. At the rear

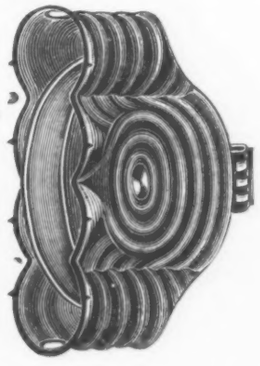


Fig. 1.—Monitor Frame Pulley.

are enabled to produce it at prices competitive with those of cast iron, while the pulley is exceptionally smooth in finish and accurate in its parts. The wheel is described as having a heavy steel hub which runs on a steel pin, its strength and durability being especially mentioned. This pulley weighs about one-third as much as ordinary cast-iron pulleys, effecting a considerable saving in transportation charges. It fits a mortise by boring ⅞ holes ⅝ inch from centers, which centers are gauged by lightly pressing the points on one edge of the face on the jamb where the mortise is to be bored. Among the other points made in favor of this pulley are these: That every wheel runs true; that being made of steel thoroughly cor-

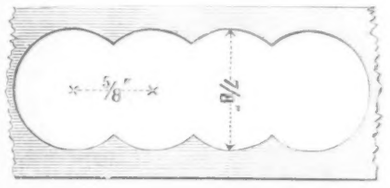


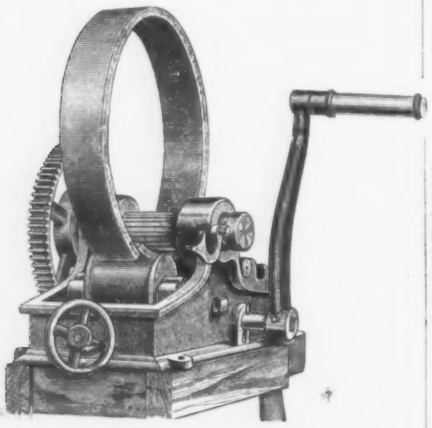
Fig. 2.—Mortise for Monitor Frame Pulley.

rugated, combining strength and rigidity with a slight degree of elasticity, it is adapted to the irregularities of hand boring; that, being made of finished material, there are no rough surfaces to chafe the cord, and that each case is of exactly the same size.

The abundance of coal and timber throughout the United States has, until lately, led to the entire neglect of the great peat deposits of this country as a source of fuel. Particular interest, therefore, attaches for some sections of the country to the efforts being made by A. P. Gotham of this city to utilize our resources in that direction. Mr. Gotham has for a good many years applied himself to the solution of this problem, and has developed the following method: Peat is cut from the deposit in the form of bricks 8 x 12 inches, which are allowed to dry in the air for four or five weeks. They are then cribbed in quantities of 50 cords each to allow the air drying to be completed. This is the raw material used as the basis in the most promising line of work which he has undertaken so far, and which has been in practical operation in Massachusetts until the works were destroyed by fire. It refers to the manufacture of a special article as a substitute for kindling wood. The air-dried brick are run through a gang-saw having six saws, which cuts them in smaller brick, 1 inch square by 5 inches long. These are then dipped in a bath of raw petroleum, absorbing from 15 to 20 per cent. of weight. In order to prevent evaporation, the bricks thus prepared are coated with rosin, the quantity being about 5 per cent. in weight. These sticks are used in the place of kindling wood for domestic stoves and ranges and for fire engines and other purposes. About 3000 tons of this prepared fuel was made and sold in the Boston market, and was found to possess the advantage over kindling wood at the same price of furnishing considerably more heat and occupying less time for kindling When it is appreciated that in this city alone there are 62 mills turning out kindling wood at the rate of about 1000 cords per day, the future of such an undertaking may well be appreciated. Mr. Gotham has also applied the same system in the manufacture of a fancy fuel to compete with cannel coal at about the same price. In this case the 8 x 12 bricks are treated in the same way, and are claimed to possess over the cannel coal the advantage that they make less dust, have no sulphur, and need not be stirred so frequently in order to produce a bright flame.

The Detroit Perfected Tire Bender.

The accompanying illustration represents a tire bender recently put on the market by the Fulton Iron and Engine Works, Detroit, Mich. The body of the machine consists of one solid casting, without bolt or nut. The rolls are described as turned true, and the machine in every respect first class, its durability and strength being especially referred to. A feature the importance of which is emphasized is the fact that the center top

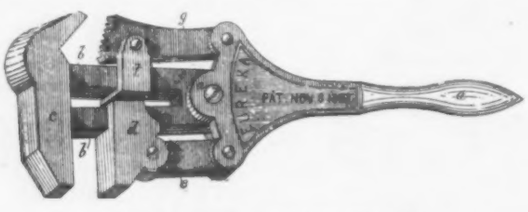


The Detroit Perfected Tire Bender.

roller is removable, allowing a heavy tire, after bending, to be taken out without springing the ends apart. It is also explained that the operator can put two or four ties in and roll them at the same time, if desired. The size of the circle ranges from 18 inches to 12 feet. All the machines are tested before leaving the works.

Self-Adjusting Combined Wrench.

The cut herewith given illustrates a combined wrench, invented and recently patented by Charles W. Hale, of Eureka, Kan. It has a central shank, with the head fastened on it at one end and the handle pivoted at the other. The shank has a central slot permitting a jaw to slide along on each side. The handle swings back and forth as desired, in order to use either jaw of the wrench. The jaws automatically adjust themselves to grip any sized nut or pipe within their range. The



Self-Adjusting Combined Wrench.

grip is controlled entirely by the handle, and the harder a nut or pipe is to turn the tighter the jaws will grip it.

The Sunshine Shoe Set.

This is the name by which the Thompson Mfg. Company, Lansingburg, N. Y., designate the blacking set represented in the accompanying illustrations, Figs. 1 and 2 showing the polisher and dauber, and Fig. 3 the manner in which the blacking is put up. The polisher, Fig. 1, is described as having a compact mass of fine elastic bristles inserted with the flag ends outward, in a back formed to fit the grasp of the hand. This back is of metal, in the form shown, and decorated as represented. The quality of the bristles is especially alluded to, and the fact that instead of their being doubled in the middle, as in the usual style of brush, the butts of the bristles are all in a solid block, leaving only the soft tapering ends for service, thus securing, it is claimed, much more efficiency in polishing. Other points in regard to the brush are that it fits the grasp perfectly, and is trimmed convex, that it may adapt itself to the curve of the shoe and not wear hollow in the center. The fullness, length and quality of the bristles, together with the mechanical construction of the brush, are alluded to as giving it a degree of efficiency and durability unattainable in other processes of manufacture.

Fig. 3.—Blacking Tube.

Fig. 2.—The Sunshine Dauber.

Fig. 2 represents the dauber, the knot of which is also solid, the construction being similar in principle to that of the polisher. The form of the handle is also shown. Besides fitting the grasp it is alluded to as set at such an angle that one is not liable to strike the fingers against the shoe while applying the blacking. The pointed end is for removing dirt where it cannot be reached with the brush. The blacking is contained in collapsible tubes, shown in Fig. 3, from which by pressure the blacking is forced in such quantities as may be desired, when, the tube being closed, that remaining in it is kept moist and in condition for use. Each set of these implements is put up in a neat box. The finish and attractiveness of these goods should be mentioned in addition to the points in their construction to which reference has been made.

New Sash Chain.

The Moore & Barnes Mfg. Company, 103 Chambers street, New York, factory at Phœnix, N. Y., are putting on the market the sash chain represented in the accompanying illustration. It is described as reinforced by corrugation of the metal at the point where other chains are weak. This corrugation gives, it is claimed, greater tensile strength than any chain made of the same weight, and adds rigidity to the bent portion of the link, so that the tensile strain brought to bear on the chain does not change the form of loop, leaving at all times the metal unimpaired by collapsing. It is pointed out that the reinforcing prevents the link from stretching flat, so that it runs smoothly over any style of pulley.

Fig. 1.—Sunshine Polisher.

New Sash Chain.

The enormous tankage of the Pennsylvania oil regions is something of which the general public have little information. Four years ago, when the quantity of oil in store reached its greatest accumulation, the aggregate tankage of the Standard and National Transit Corporations was 43,000,000 barrels, built at an expenditure of $14,000,000, and this exclusive of about 6,000,000 barrels of tankage owned by individual producers. Under more economical methods and a reduced output the proportion of empty tankage has increased until now there are 11,500,000 barrels of capacity in disuse. Since 1885 over 4,500,000 barrels of tankage, erected at a cost of about 50 cents per barrel, has been removed, principally to the oil regions of Ohio. As each barrel represents about five pounds of iron, the National Transit Company alone at one time owned over 100,000 tons of iron tanks. Thousands of miles of pipe from 2¼ to 8 inches in diameter are parts of the same system of storing and transporting oil, which has assumed such enormous proportions under the stimulus of oil traffic.

The River Plate lumber trade has gained in importance during the last two years, in consequence of extensive railroad building in the Argentine Republic, and the rapid increase of immigration. The shipments from the United States in 1887 comprised 76,000,000 feet of white pine, 53,500,000 feet of spruce, 82,500,000 feet of pitch pine, and 8,360,000 feet of hard woods. The United States needs and should have direct steam communication, regular mails and good banking facilities, and a great trade could be built up with the River Plate and other South American countries.

R. M. Hazeltine, of Mahoning County, Ohio, has been appointed by the Governor to be chief inspector of mines of that State.

CURRENT HARDWARE PRICES.

FEBRUARY 29, 1888.

Note.—The quotations given below represent the Current Hardware Prices which prevail in the market at large. They are not given as manufacture prices, and manufacturers should not be held responsible for them. In cases where goods are quoted at lower figures than the manufacturers name, it is stated that the manufacturers are selling at the prices quoted, but simply that the goods are being sold, perhaps by the manufacturers, perhaps by the jobbe at the figures named.

Ammunition.

Caps, Percussion, ₩ 1000—
Hicks & Goldmark's
F. L. Waterproof, 1-10's.....50¢
E. B. Trimmed Edge, 1-10's.....65¢ } dis 25@
E. B. Ground Edge, Central Fire, 1-10's. 70¢ } 25&
Double Waterproof, 1-10's.....$1.40 } 7½ %
Musket Waterproof, 1-10's.....62¢ @ 63¢
G. D.....28¢
S. B.....30¢
Union Metallic Cartridge Co.
F. C. Trimmed.....50¢
F. L. Ground.....65¢ } dis 25@
Cen. Fire Ground.....70¢ } 25&
Double Waterproof.....$1.40 } 7½ %
Double Waterproof, in 1-10's.....$1.40
S. B. Genuine Imported.....45¢
Eley's E. B.....54¢ @ 55¢
Eley's D Waterproof, Central Fire.....$1.60

Cartridges—
Rim Fire Cartridges.....dis 50&5&2 %
Rim Fire Military Cartridges.....dis 15&2 %
Cen. Fire Cartridges, Pistol and Rifle...dis 25&5&2 %
Cen. Fire Cartr., Military & Sporting...dis 15&5&2 %
Blank Cartridges, except 22 and 32 cal., an additional 10 % over above discounts.
Blank Cartridges 22 cal.....$1.75, dis 2 %
Blank Cartridges, 32 cal.....$3.50, dis 2 %
Primed Shells and Bullets.....dis 1? &5&2 %
B. B. Caps, Round Ball.....$1.75, dis 2 %
B. B. Caps, Conical Ball, Swaged.....$2.00, dis 2 %

Primers—
Berdan Primers all sizes, and B. L. Caps (for Sturtevant Shells).....$1.00, dis 2 %
All other Primers, all sizes.....$1.20 dis 2 %

Shells—
First quality, 4, 8, 10 and 12 gauge...dis 25&10&2 %
First quality, 14, 16 and 20 gauge (§10 list).....dis 30&10&2 %
Star, Club, Rival and Climax Brands, 10-gauge, §9 list } dis 25&10
Climax Brands, 12-gauge, §8 list } 2 %
Club Rival and Climax Brands, 14, 16 and 20 gauge.....dis 30&10&2 %
Selbold's Combination Shot Shells.....dis 15&2 %
Brass Shot Shells, 1st quality.....dis 60&2 %
Brass Shot Shells, Club, Rival & Climax...dis 65&2 %

Shells Loaded—
List No. 19, 1887.....dis 20 & 10 %

Wads—
U. M. C. & W. R. A.—B. E., 11 up....$2.00
U. M. C. & W. R. A.—B. E., 9&10....2.30
U. M. C. & W. R. A.—E. E., 7&8....2.60
U. M. C. & W. R. A.—P. E., 11 up....3.10
U. M. C. & W. R. A.—P. E., 9&10....4.00
U. M. C. & W. R. A.—P. E., 7&8....4.60
dis 20&2 %
Eley's B. E., 11 up.....$1.75
Eley's P. E., 11 @ 20.....$2.80

Anvils.—Eagle Anvils....₩ ℔ 10¢, dis 20 @ 20&5 %
Wright's.....8½¢
Armitage's Mouse Hole.....8¢
Armitage Mouse Hole, Extra.....11½ @ 11½¢
Trenton.....9¼¢@9½¢
Wilkinson's.....9½ @10¢
I. & Riley Carr Patent Solid.....11@11½¢

Anvil Vise and Drill—
Millers Falls Co.....$18.00, dis 20 %
Cheney Anvil and Vise.....dis 25 %
Allen Combined Anvil and Vise.....$3, dis 40&10 %
Moore & Barnes Mfg. Co.....dis 33⅓ %

Augers and Bits.

Douglass Mfg. Co.
New Haven Copper Co.
Wm. A. Ives & Co.
Humphreysville Mfg. Co.
French, Swift & Co. (F. H. Beecher)
Connecticut Valley Mfg. Co
} ...dis 70@70&5 %
Cook's, Douglass Mfg. Co.....dis 55 %
Cook's, New Haven Copper Co...dis 50&10&50&10&5 %
Ives' Circular Lip.....dis 60 %
Patent Solid Head.....dis 30 %
C. E. Jennings & Co., No. 10, extension l'p.....dis 40 %
C. E. Jennings & Co., No. 30.....dis 60 %
C. E. Jennings & Co., Auger Bits, in fancy boxes.
₩ set, 32⅛ quarters, No. 5, §5; No. 3, §.....dis 20 %
Lewis' Patent Single Twist.....dis 40 %
Russell Jennings' Augers and Bits.....dis 25 %
Imitation Jennings Bits, new list).....dis 60@6 .. %
Pugh's Black.....dis 20 %
Car Bits.....dis 50&10 .60 %
L'Hommedieu Car Bits.....dis 15&10 %
Forstner Pat. Auger Bits.....dis 10 %

Hollow Augers—
Ives' } dis 25&10 @
French, Swift & Co. } 25&10&2 %
Douglass'.
Bonney's Adjustable ₩ doz. $48.....dis 40&10 %
Stearns'.....dis 20&10 %
Ives' Expansive, each $4.50.....dis 50&10 %
Universal Expansive, each $4.50.....dis 20 %
Wood's.....dis 25 @ 25&10 %

Expansive Bits—
Clark's small, §18; large, §36.....dis 35 @ 35&5 %
Ives' No. 4, per doz., $60.....dis 35 @ 40 %
Swan's.....dis 40 %
Steer's, No. 1, §36; No. 2, §28.....dis 35 %
Stearns' No. 2, §48.....dis 20 %

Gimlet Bits—
Common.....₩ gross $2.75 @ $3.25
Diamond.....₩ doz. $1.10 dis 25&10 %
"Bee".....dis 25 @ 25&5 %
Double Cut, Shepardson's.....dis 45 @ 45&5 %
Double Cut, Ct. Valley Mfg. Co.....dis 30&10 %
Double Cut, Hartwell's, ₩ gro.....$5.25
Double Cut, Douglass'.....dis 40&10 %
Double Cut, Ives'.....dis 60 @ 60&5 %

Bit Stock Drills—
Morse Twist Drills.....dis 60&10&5 %
Standard.....dis 50&10 &5 %
Cleveland.....dis 50&10 &5 %
Syracuse, for metal.....dis 50&10&5 %
Syracuse, for wood (wood list).....dis 30 & 30&5 %
Williams' or Holt's, for metal.....dis 50&10&10 %
Williams' or Holt's, for wood.....dis 40&10 %

Ship Auger and Bit—
L'Hommedieu's.....dis 15 &10 %
Watrous's.....dis 15 &10 %
Snell's.....dis 15 &10 %
Snell's Ship Auger Pattern Car Bits.....dis 15&10 %

Awl Hafts.
Sewing, Brass Ferrule.....$3.50 ₩ gross—dis 45&10 %
Patent Sewing, Short.....$1.00 ₩ doz—dis 40&10 %
Patent Sewing, Long.....$1.20 ₩ doz.—net
Patent Peg, Plain Top.....$10.00 ₩ gross—dis 45&10 %
Patent Peg, Leather Top....$12.00 ₩ gross—dis 45&10 %

Awls, Brad Sets, &c.
Awls, Sewing, Common.....₩ gross $1.70—dis 35 %
Awls, Shouldered Peg....₩ gross $2.45—dis 40@40&10 %
Awls, Patent Peg.....₩ gross 63¢—dis 40@40&10 %
Awls, Shouldered Brad.....$2.70 ₩ gross—dis 35 %
Awls, Handled Brad.....$7.50 ₩ gross—dis 45 %
Awls, Handled Scratch.....$7.50 ₩ gross—dis 35&10 %
Awls, Socket Scratch.....$1.50 ₩ doz—dis 25 @ 30 %

Awl and Tool Sets.
Allen's Sets Awls & Tools, No. 20, ₩ doz. $10—dis 50&10 %
Gray's Ad Tool Hdls., Nos. 1, $12; 2, $18.; 3, $12; 4, $9. dis 25& 25&10 %
Miller's Falls Adj. Tool Hdls., Nos. 1, $12; 2, $18. dis 25 %
Henry's Combination Raft.....₩ doz $6
Brad Sets, No. 42, $10.50, No. 43, $12.50...dis 70&10&5 %
Brad Sets, Stanley's Excelsior, No. 1, $7.50. } dis 30&10 %
Brad Sets, Stanley's Excelsior, No. 2 $4.00. }
Brad Sets, Stanley's Excelsior, No. 3, $5.50. }

Axes.
Makers' and Special Brands—
First quality.....₩ doz. $6.25 @ $6.50
Others.....₩ doz. $5.75

Axle Grease.
Fraser's, in bulk.....Keg ₩ ℔, 4¢; Pail, ₩ ℔, 5¢ net
Frasers, in boxes.....₩ gross $9.50
Dixon's Everlasting, in bxs., ₩ doz., 1 ℔ $1.20; 2 ℔, $2
Dixon's Everlasting.....10 ℔ pails, each, 85¢
Lower grades, special brands.....₩ gro $5.50 @ $7

Axles.—No. 1, 4¢ @ 4¼¢ No. 2, 5¼ @ 5½¢.
Nos. 7 to 18.....dis 40&10 @ 50 %
Nos. 19 to 22.....dis 60&10 @ 60&10&10 %
National Wrought Steel Tubular Self-Oiling:
Standard Farm (1 to 5) and Special Farm (A1 to A5)
Less than 10 sets.....dis 33⅓ %
Over 10 sets.....dis 33⅓&5 %
X Strong Exp. (6 to 9), & XX Strong Truck (10 to 16):
Less than 10 sets.....dis 10 %
Over 10 sets.....dis 10&5 %

Bag Holders.
Sprengle's Pat., ₩ doz $18.....dis 60 %

Balances.—Spring Balances.....dis 50 %
Common 24 ℔.....₩ doz., $1.50—dis 50 %
Chatillon's Spring Balances.....dis 50 %
Chatillon's Circular Spring Balances.....dis 60 %

Bells.
Hand—
Light Brass.....dis 70&10 %
Extra Heavy.....dis 60&10 %
White Metal.....dis 6 &10&10 %
Silver Chime.....dis 25&10&5 %
Globe (Cone's Patent).....dis 25&10 @ 35 %
Gong—
Gong, Abbe's.....dis 25&10 @ 35 %
Gong, Yankee.....dis 40&10 %
Gong, Barton's.....dis 40&10 @ 50 %
Crank, Taylor's.....dis 25&10 %
Crank, Brooks'.....dis 50&10&2 %
Crank, Cone's.....dis 10 %
Crank Connell's.....dis 20&10 %
Lever, Sargent's.....dis 60&10 %
Lever, Taylor's Bronzed or Plated.....net
Lever, Taylor's Japanned.....dis 25&10 %
Lever, R. E. ₩ Co's.....dis 50&10&2 %
Full, Brook's.....dis 50&10&2 %
Bell Western.....dis 25&10 %
Cow—
Common Wrought.....dis 60&10 %
Western.....dis 20&10 %
Western, Sargent's list.....dis 70&10 %
Kentucky "Star".....dis 20&10 %
Kentucky, Sargent's list.....dis 70&10 %
Dodge, Genuine Kentucky, new list.dis 70&70&10 %
Texas Star.....dis 50&10 @ 50&10&5 %
Fall.....dis 40&40&5 %
Farm Bells.....₩ ℔, 2¾¢ @ 3¢
Steel Alloy Church and School Bells.....dis 40 %

Bellows.—Blacksmiths'.....dis 40&10&5 @ 60 %
Miners'.....dis 40&10 @ 10 %
Hand Bellows.....dis 4 &10 @ 10 %

Belting, Rubber.
Common Standard.....dis 75 %
Standard.....dis 70&5 %
Extra.....dis 60&10 %
N. Y. B. & P. Co., Standard.....dis 60&5&5 %
N. Y. B. & P. Co., Extra Standard.....dis 50&10&5 %

Bench Stops.
Worrill's.....₩ doz $9—dis 50 %
Hotchkiss's.....₩ doz $5.00—dis 10 @ 10&10 %
Weston's, per dos No. 1, §10; No. 2, §9. .dis 25&10&5 %
McGill's.....₩ doz $3—dis 10 %

Bits—Auger, Gimlet Bit Stock, Drills, &c., see Augers and Bits.

Bit Holders.
Extension, Barber's.....₩ doz $15. ..dis 40 @ 40&10 %
Extension, Ives'.....₩ doz $30.00—dis 60&5 @ 60&10 %
Diagonal.....₩ doz $24.00—dis 40 %
Angular.....₩ doz $24.00—dis 40&5 %

Blind Adjusters.
Domestic.....₩ per doz $3.00—dis 33⅓ %
Excelsior.....₩ doz $10.00—dis 50&10&2 %
Washburn's Self-Locking.....dis 20 @ 20&10 %

Blind Fasteners.
Mackrell's.....₩ doz pairs, $1.00—dis 20@20&10 %
Van Sand's Screw Pattern.....$15 ₩ gro.—dis 60&10 %
Van Sand's Old Pattern.....$15 ₩ gro.—dis 55&10 %
Washburn's Old Pattern.....₩ ₩ gro. net
Merriman's.....new list, net
Austin & Eddy No. 3008.....₩ ₩ gro. net
Security Gravity.....₩ ₩ gro. net

Blind Staples.
Barbed, ½ in. and larger.....₩ ℔ 8 @ 8½¢ net
Barbed, ¼ in.....₩ ℔ 9 @ 9½¢ net

Blocks.
Ordinary Tackle, list April 17, '85.....dis 40 %
Cleveland Block Co., Mal. Iron.....dis 50 %

Bolts
Door and Shutter—
Cast Iron Barrel, Square, &c.....dis 70 @ 70&10 %
Cast Iron Shutter Bolts.....dis 70 @ 70&10 %
Cast Iron Chain, Sargent's list.....dis 60&10 %
Ives' Patent Door Bolts.....dis 55 %
Wrought Barrel.....dis 70 @ 70&10 %
Wrought Square.....dis 70 @ 70&10 %
Wrought Shutter all Iron, Stanley's list.....dis 60&10 %
Wrought Shutter Brass Knob, Stanley's.....dis 40&10 %
Wrought Shutter, Sargent's list.....dis 60&10 %
Wrought Sunk Flush, Sargent's list.....dis 55&10 %
Wrought Sunk Flush, Stanley's list....dis 40&10&2 %
Wrought B.S. Flush, Com'n Stanley's list. dis 55&10 %

Carriage—
Com. list June 10, '84.....dis 70&10&3
Genuine Eagle, list Oct., '84.....dis 75 @ 75&5
Phila. pattern, list Oct. 7, 84...dis 75&10@75&10&5
R. B. & W., old list.....dis 70

Tire—
Common, list Feb. 28, 1883.....dis 65&10 %
P. C. B. & N. Co., Empire, list Feb. 28, 1883, dis 65&10 %
P. C. B. & N. Co., Philadel. list Oct. 84. dis 62½ %
P.C.B.&N.Co., Keystone, Phil. list Oct '84.... dis 80 %
P.C.B.&N.Co., Norway, Phil. list, Oct. '84. dis 75&10 %
Am. S. Co., Norway, Phil., list Oct. 16, 84..dis 75&10 %
Am. S. Co., Eagle, Phil., list Oct. 16, '84.....dis 80 %
Am. S. Co., Philadel. list. Oct. 16 '84.....dis 80½ %
Am. S. Co., Bay State, list Sep. 28, '83.....dis 65&10 %
R. B. & W., Philadel. list Oct. 16, 1884.....dis 82 %
R. & E. Mfg. Co.....dis 65 %

Stove and Plow—
Stove.....dis 62½ %
Plow.....dis 60&5 %
Am. S. Co. Stove, Annealed.....dis 62½ %
R. B. & W., Plow.....dis 55 %
R. B. & W., Stove.....dis 62½ %
R. & E. Mfg. Co., Stove.....dis 62½ %
Machine.....dis 75@75&5 %
Bolt Ends.....dis 75@75&5 %

Borax.....₩ ℔ 9½@10½¢

Boring Machines.

Without Augers.	Upright.	Angular.
Douglas	$5.50	$6.75.....dis 50 %
Snell's, Rice's Patent	5.50	6 75, dis 40&10&10 %
Jennings	5.50	6.75, dis 45&45&10 %
Other Machines	2.35	2.75.....net
Phillips' Pat., with Augers	7.00	7.50.....net

Bow Pins
Sumason, Beckley & Co.'s.....dis 60&10 %
Sargent & Co.'s.....$17 and $18, dis 60&10 %
Peck, Stow & W. Co.....dis 50&10 @ 50&10&5 %

Braces.
Rackus, Nos. 110 to 114 and 31 to 33..dis 60&5&60&10%
Rackus, Nos. 6, 8, 12, 14.....dis 60&10&5 %
Rackus, Nos. 16, 18, 20, 29, 7, 9, 11.....dis 70&10&5 %
Barber's, Nos. 10 to 16.....dis 50 %
Barber's, Nos. 30 to 33.....dis 50 %
Barber's, Nos. 40 to 63.....dis 50&10 %
Barker's, Nos. 8, 10 and 12.....dis 75&10&80 %
Barker's, Plated, Nos. 8, 10 and 12.....dis 65&10&70 %
Osgood's Ratchet.....dis 40&10&50 %
Spofford's.....dis 50&10 %
Ives' New Haven Novelty.....dis 70 @ 70&5 %
Ives' New Haven Ratchet.....dis 6 &20 @ 60&10 %
Ives' Barber Ratchet.....dis 60&5 @ 60&10 %
Ives' Barbers.....dis 60&5 @ 60&10 %
Ives' Spofford.....dis 60&5 @ 60&10 %
Common Ball, American.....$1.10 @ $1.15
Bartholomew's, Nos. 25, 27, 30.....dis 50&10&60&5 %
Bartholomew's, Nos. 117 118, 119.....dis 70 @ 70&5 %
Amidon's Barker's Imp. Plain.....dis 75&10 @ 80 %
Amidon's Barker's Imp. Nickeled.....dis 65&10 @ 70 %
Amidon & Barcher.....dis 75&10 @ 80 %
Amidon's Eclipse Ratchet.....dis 60 %
Amidon's Globe Jawed.....dis 40&40&10 %
Amidon's Corner Brace.....dis 40 @ 40&10 %
Amidon's Universal.....8 in., 12.10; 10 in., $2.25
Amidon's Buffalo Ball.....$1.10 @ $1.15
P. S. & W.....dis 50&10 %

Brackets.
Shelf, plain, Sargent's list.....dis 55&10 @ 55&10&10 %
Shelf, fancy, Sargent's list.....dis 60&10 @ 60&10&10 %
Reading, plain.....dis 60 &10 @ 60&10&5 %
Reading, Rosette.....dis 60&10 @ 60&10&10 %

Bright Wire Goods.—.....dis 70&10&10 @— %

Broilers.

	Each.	9	10	9 x 11
Dennis' Self-Basting.	Per doz.	$4 50	5.50	6.50

Buckets.—See Well Buckets and Pails.

Bull Rings.—Union Co. Nut.....dis 55 %
Sargent's.....dis 60&10 @ 70&5 %
Botcnkiss' low list.....dis 30 %
Sumason, Beckley & Co.'s.....dis 70 %
Peck, Stow & W. Co.'s.....dis 50&10 @ 50&10&10 %
Ehrich How. Co., White Metal, low list.dis50@50&10 %

Butcher's Cleavers.
Bradley's.....dis 25 @ 30 %
L. & I. J. White.....dis 20&5 %
Beatty's.....dis 40 @ 40&5%

1	2	3	4	5	6	7	8
$16.50	19.00	21.50	24.00	27.00	30.00	$3.50	$6.50

New Haven Edge Tool Co.'s.....dis 40 %
P. S. & W.....dis 33⅓&5 33⅓&10 %

Butts.
Brass—
Wrought Brass.....dis 70@7 &10 %
Cast Brass, Tiebout's.....dis 33⅓ %
Cast Brass, Corbin's Fast.....dis 33⅓&10 %
Cast Brass, Loose Joint.....dis 33⅓&10 %

Cast Iron—
Fast Joint, Narrow.....dis 50&10 %
Fast Joint, Broad.....dis 55&10 %
Loose Joint.
Loose Joint, Japanned.
Loose Joint, Jap. with Acorns.
Parliament Butts.
Mayer's Hinges.
Loose Pin, Acorns.
Loose Pin, Acorns, Japanned.
Loose Pin, Acorns, Jap, Pltd. Tips.
} dis 66⅔&10 %

Wrought Steel—
Fast Joint Narrow.....dis 65&10&70 %
Fast Joint, Lt. Narrow.....dis 65&10&70 %
Fast Joint, Broad.....dis 65&10&70 %
Loose Joint, Broad.....dis 65&10.&70&5 %
Table Butts, Back Flaps, &c.....dis 65&10&70 %
Inside Blind, Regular.....dis 65&10&70 %
Inside Blind, Light.....dis 65&10&70 %
Loose Pin, Wrt.....dis 65&10&70&5 %
Loose Pin, Light.....dis 65&.06&70&5 %
Bronzed Wrought Butts.....dis 40&40&10 %

Calipers—See Compasses.

Calks, Toe
Gautier.....₩ ℔ 5¼@6¢
Dewicks.....₩ ℔ 5½@6¢

Can Openers.
Messenger's Comet.....₩ doz $3.00, dis 25 %
American.....₩ gross $3.00
Duplex.....₩ doz 25¢, dis 15 @ 20 %
Lyman's.....₩ doz $3.75, d's 20 %
No. 4 French.....₩ doz $2.25, dis 55 @ 60 %
No. 5, Iron handle.....₩ gross $6.00, dis 45 @ 50 %
No. 5, Iron handle.....₩ doz $2.50, dis 10 %
Eureka.....₩ doz $7.00, dis 55 %
Sardine Scissors.....₩ doz $5.00, dis 25&25 %
Star.....₩ doz $5.00, dis 25&25 %
Sprague, No. 1, §9; 2, §..... 3, $2.50.....dis 50&10&10

World's Best, ₱ gross, No. 1, $12.00; No. 2, $24.00; No. 3, $36.00.....dis 50&10 %
Universal.....₱ doz $3.00, dis 35&5 %
Domestic.....₱ doz $2.50, dis 45 %
Champion.....₱ doz $2.00, dis 50 %

Cards.
Horse and Curry.....dis 10 @ 10&10 %
Cotton.....New list, Aug., 1883, dis 10 %
Wool..... " " " dis 10 %

Carpet Stretchers.
Cast Steel, Polished.....₱ doz $3.25
Cast Iron, Steel Points.....₱ doz 80¢
Sockot.....₱ doz $1.75
Bullard's.....dis 25 @ 25&10 %

Carpet Sweepers.
Bissell No. 5.....₱ doz $17.00
Bissell No. 7 New Drop Pan.....₱ doz $19.00
Bissell Grand.....₱ doz $36 00
Grand Rapids.....₱ doz $24.00
Crown Jewel.....No. 1, $18; No. 2, $19; No. 3, $20
Magic.....₱ doz $15.00
Jewel.....₱ doz $17.00
Mystic.....₱ doz $16.00
Cottage.....₱ doz $15.00
Garland.....₱ doz $18.00
Parlor Queen.....₱ doz $24.00
Housewife's Delight.....₱ doz $15.00
Queen.....₱ doz $16.00
Queen, with band.....₱ doz $18.00
King.....₱ doz $80.00
Weed Improved.....₱ doz $18.00
Hub.....₱ doz $16.00
Cog Wheel.....₱ doz $16.00

Cartridges.—See Ammunition.

Casters.
Bed, Plate, Shallow Socket } New list: Brass dis 55 %; Others..dis 60 %
Deep Socket.....40&10 %
Yale Casters, list May, 1884.....dis 30&10&40 %
Yale, Gem.....dis 60&60&5 %
Martin's Patent (Phœnix).....dis 45&10 @ 50 %
Parson's Anti Friction.....dis 60 %
"Giant" Truck Casters.....dis 10 @ 10&5 %
Stationary Truck Casters.....dis 45&10

Cattle Leaders.
Humason, Beckley & Co.'s.....dis 70 %
Sargent's.....dis 66⅔&10 %
Hotchkiss.....dis 30 %
Peck Stow & W. Co.....dis 50&10 %

Chain.
Trace, 6/4-10-2, exact sizes, ₱ pair, $1 03 } dis 50&10&5
Trace, 6/4-10-3, exact sizes, ₱ pair, .92 } @ 50&10&7½ %
Trace 7-10-2, exact sizes, ₱ pair, 1.11 }
NOTE.—Traces, "Regular" sizes 3¢ net ₱ pair less than exact.
Log, Fifth, Stretcher, and other fancy Chains, list Nov. 1 1884.....dis 50&10 @ 50&10&5 %
American Coil 3-16 ¼ 5-16 ⅜ 7-16 ½ ⅝ ¾
In cask lots. 3.50 6.25 5.25 4 60 4.40 4.20 3.95 3.75
Less than cask lots add ¼¢@½¢ ₱ ℔.
German Coil, list of June 20, 1887.....dis 60@60&5 %
Ger. Halter Chain, list of June 20, 1887...dis 60@60&5 %
Covert Halter, Hitching and Breast.....dis 50&2 %
Covert Traces.....dis 55@2 %
Oneida Halter Chain (old list).....dis 45 %
Galvanized Pump Chain.....₱ ℔ 6½ @ 6 ¢
Jack Chain, Iron.....dis 70&10 @ 75 %
Jack Chain, Brass.....dis 70 @ 70&10 %

Chalk.
White.....₱ gro 55¢
Red.....₱ gro 75¢
Blue.....₱ gro 90¢
White Crayons.....₱ gro 12¢ @ 12½¢

Chalk Lines.—See Lines.

Chisels.
Socket Framing and Firmer—
Witherby and Douglas, P., S. & W., New Haven and Middlesex, Mix } dis 75&5 @ 75&10 %
Buck Bros.....dis 30 %
Merrill.....dis 60&10@60&10&5 %
L. & I. J. White.....dis 30 @ 30&5 %
Tanged Firmers.....dis 40&10 @ 50 %
Tanged Firmers, Butcher's.....$4.75 @ $5.00
Tanged Firmers, Spear & Jackson's.....$5.00 to £
Tanged Firmers, Buck Bros.....dis 30 %
Cold Chisels, ₱ ℔.....16¢ @ 19¢

Chucks.
Beach Patent.....each, $3.00, dis 20 %
Morse's Adjustable.....each, $7.00, dis 20 @ 20&5 %
Danbury.....each, $6.00, dis 30 @ 40&5 %
Syracuse, Bals Pat.....dis 25 %

Clamps.
Providence Tool Co.'s Wrought Iron.....dis 25 %
Adjustable, Gray's.....dis 20 %
Adjustable, Lambert's.....dis 20 %
Adjustable, Snow's.....dis 40&5 %
Adjustable, Hammer's.....dis 15 %
Adjustable, Stearns'.....dis 20&10 %
Stearns' Adjustable Cabinet and Corner...dis 20&10 %
Cabinet Sargent's.....dis 66⅔&10 %
Carriage Makers', Sargent's.....dis 66⅔&10 %
Eberhard Mfg. Co.....dis 40&5 @ 40&10 %
Warner's.....dis 40&10 @ 40&10&5 %
Saw Clamps.....See Vises

Clips.
Norway, Axle, ¼ & 5-16.....dis 55&5&5
Second grade Norway Axle, ¼ & 5 16.....dis 65&5
Superior Axle Clips.....dis 66⅔&5 @ 66⅔&20&5 %
Norway Spring Bar Clips, 5-16.....dis 60&5&5
Wrought-Iron Felloe Clips.....₱ ℔ 5½¢
Steel Felloe Clips.....₱ ℔ 5¢

Cockeyes......dis 50 %

Cocks, Brass.
Hardware list.....dis 40&10&2 %

Coffee Mills.
Box and Side. List revised Jan. 1, 1888.....dis 50&2 %
Seisor's Patent.....$4.50, $10.50, dis 2p %
American, Enterprise Mfg Co.....dis 20&10&30 %
The "Swift," Lane Bros.....dis 20&10 %
Webb's Patent.....dis 45 %

Compasses, Dividers, &c.
Compasses, Calipers, Dividers.....dis 70@70&10 %
Bemis & Call Co.'s Dividers.....dis 60&5 %
Bemis & Call Co.'s Compasses & Calipers....dis 50&5 %
Bemis & Call Co.'s Wing & Inside or Outside..dis 50&5 %
Bemis & Call Co.'s Double.....dis 60 %
Bemis & Call Co.'s (Call's Patent Inside).....dis 30 %
Excelsior.....dis 50 %
J. Stevens & Co.'s Calipers and Dividers....dis 25&10 %

Coopers' Tools.
Bradley's.....dis 20 %
Barton's.....dis 20&20&5 %
L. & I. J. White.....dis 20&5 %
Albertson Mfg. Co.....dis 25 %
Beatty's.....dis 10 @ 40&5 %
Sandusky Tool Co.....dis 30 @ 30&5 %

Corkscrews.
Humason & Beckley Mfg. Co.....dis 40 @ 40&10 %
Clough's Patent.....dis 33⅓ @ 33⅓&5 %
Howe Bros. & Halbert.....dis 35 %

Corn Knives and Cutters.
Bradley's.....dis 10 %
Wadsworth's.....dis 25 %

Cradles.—Grain.....dis 50&10 @ 60 %

Crow Bars.
Cast Steel.....₱ ℔ 4¢
Iron, Steel Points.....₱ ℔ 3½¢

Curry Combs.
Fitch's.....dis 50&10 @ 50&10&10 %
Rubber.....₱ doz $10.00, dis 20 %
Perfect.....dis 50 %

Curtain Pins.
Silvered Glass.....net
White Enamel.....net

Cutlery.
Beaver Falls and Booth's.....dis 33⅓ %
Wostenholme.....$7.75 to £

Dampers, &c.
Dampers and Clips, Buffalo.....dis 40 %
Crown Damper.....dis 40 %
Excelsior.....dis 40&10 %

Dividers.—See Compasses.

Dog Collars.
Embossed Gilt, Pope & Stevens' list.....dis 30&10 %
Leather, Pope & Stevens' list.....dis 40 %
Brass, Pope & Stevens' list.....dis 40 %

Door Springs.
Torrey's Rod, regular size.....₱ doz $1.30
Gray's.....₱ gro, $20.00, dis 20 %
Bee Rod.....₱ gro, $30.00, dis 20 %
Warner's No. 1, ₱ doz. $2.50; No. 2, $3.30, dis 40&10&5 %
Gem Coil, list April 19 1886.....dis 10 %
Star Coil, list April 19, 1886.....dis 30 %
Victor (Coil).....dis 60 @ 60&10 %
Champion (Coil).....dis 60&10 @ 60&10&10 %
Philadelphia.....6 in., $5.00; 8 in., $7.75, dis 30 %
Cowell's.....No. 1, ₱ doz $18.00; No. 2, $15.00, dis 50 %
Rubber, complete.....₱ doz $4.50, dis 55&10 %
Hercules.....dis 50 %
Shaw Door Check and Spring.....dis 25 @ 30 @ 35 %
Elliott's Door Check and Spring.....dis 25 %

Drawing Knives.
Witherby and Douglas, P., S. & W. } dis 75&10 @ 75, 10&5 %
New Haven and Middlesex.....
Merrill.....dis 60&10&10 %
Watrous.....dis 15&10 @ 25 %
L. & I. J. White.....dis 20&5 %
Bradley's.....dis 35 %
Adjustable Handle.....dis 20 @ 25 %
Wilkinson's Folding.....dis 25 @ 25&5 %

Drills and Drill Stocks.
Blacksmiths'.....each, $1.60 @ $1.65
Blacksmiths' Self-Feeding.....each, $7.50, dis 20 %
Breast, P. S. & W.....dis 40&10 %
Breast, Wilson's.....dis 33⅓&5 %
Breast, Millers Falls.....each, $3.00 dis 25 %
Breast, Bartholomew's.....each, $3.50, dis 25&10 @ 40 %
Ratchet, Merrill's.....dis 20 @ 20 & 5 %
Ratchet, Ingersoll's.....dis 25 %
Ratchet, Parker's.....dis 20 @ 20&5 %
Ratchet, Whitney's.....dis 20&10 %
Ratchet, Weston's.....dis 20&25 %
Ratchet, Moore's Triple Action.....dis 25 & 30 %
Whitney's Hand Drill, Plain, $11.00, Adjustable, $12.00.....dis 20&10 %
Wilson's Drill Stocks.....dis 1' %
Automatic Boring Tools.....each, $1.75 @ $1.85

Twist Drills—
Morse.....dis 50&10&5 %
Standard.....dis 50&10&5 %
Syracuse.....dis 50&10&5 %
Cleveland.....dis 50&10&5 %
Williams.....dis 50&10&10 %

Drill Bits.—See Augers and Bits.

Drill Chucks.—See Chucks.

Driving Pans.
Small sizes.....₱ ℔ 7 ¢
Large sizes.....₱ ℔ 6½ ¢

Egg Beaters.
Dover.....₱ doz., $2.70
National.....₱ doz $4.50, dis 33⅓ %
Family (T. & S. Mfg. Co.).....₱ gro, $17.00 & $18.00
Standard (Standard Co.).....₱ gro, $9 00
Kingston (Standard Co.).....₱ gro, $6.50
Acme (Standard Co.).....₱ gro. $6.00
Duplex (Standard Co.).....₱ gro, $18.00
Rival (Standard Co.).....₱ gro $.2 00
Triumph (T. & S. Mfg. Co.).....₱ gro, $10.50 & $11.50
Advance No. 1.....₱ gro $10.50
Advance, No. 2.....₱ gro $10.00
Bryant's.....₱ gro $15 00
Ames' Spiral.....₱ gro $5
Paine, Diehl & Co.'s.....₱ gro $24.00

Electric Bell Sets.—Wollensak's.....dis 15 %
Bigelow & Dowse.....dis 20 %

Emery.	No. 4 to 46 gr.	No. 54 to 150 gr.	Flour. CF FF.
Kegs, ₱ ℔	4 ¢	5 ¢	2½¢
½ kegs, ₱ ℔	4¼¢	5¼¢	2¾¢
¼ kegs, ₱ ℔	4½¢	5½¢	3 ¢
10 ℔ cans 10 in case	6 ¢	6½¢	5 ¢
10-℔ cans, less than 10	10 ¢	10 ¢	7½¢

Enameled and Tinned Ware.—See Hollow-Ware.

Escutcheon Pins.
Iron list Nov. 11, 1885.....dis 50&10 @ 50&10&5
Brass.....dis 60 @ 60&5 %

Escutcheons.
Door Lock.....Same discounts as Door Locks
Brass Thread.....dis 60 @ 60&10 %
Wood.....dis 25 %

Faucets.
Fenn's.....dis 40 %
Bohren's Patent Rubber Ball.....dis 25 %
Fenn's Cork Stops.....dis 33⅓ %
Star.....dis 60 @ 60&5 %
Fraze's Patent Petroleum.....dis 40&10&2 %
West's Patent Key.....dis 50&10 %
Anchor Lock.....dis 45 %
Metallic Key, Leather Lined.....dis 55&10 @ 60&10 %
Cork Lined.....dis 70 @ 70&10 %
Burnside's Red Cedar.....dis 50 %
Burnside's Red Cedar, bbl. lots.....dis 50&10 %
J Sommer's Best Block Tin Key.....dis 40 %
J. Sommer's Cork Lined, 1st quality.....dis 50 %
J. Sommer's Diamond Lock.....dis 40 %
J. Sommer's Perfection, Fla. Red Cedar.....d's 50 %
J Sommer's Goodenough Cedar.....dis 60 %
Self-Measuring, Enterprise.....₱ doz $36.00—dis 20&10 %
Self-Measuring, Lane's.....₱ doz $36.00—dis 25&10 %
Self-Measuring, Victor.....₱ doz $36.00—dis 25&10 %

Felloe Plates......₱ ℔ 6 @ 6½¢

Fifth Wheels.—Derby and Cincinnati.dis 45&5 %

Files.
Domestic—
Best Grands.....dis 60&10 @ 60&10&5 %
Good brands.....dis 60&10&5 @ 60&10&10 %
Fair brands.....dis 70 @ 70&10 %
Heller's Horse Rasps.....dis 60&7½ @ 50&10 %
Imported—
J. & Riley Carr.....List, April 1, 1883, dis 15 %
J. & Riley Carr Horse Rasps.....dis 10 %
Moss & Gamble.....List April 1, 1883, dis 15 %
Butcher.....Butcher's list, dis 20 %
Stubs.....Stubs list, dis 25 @ 30 %
Turton's.....Turton a list dis. 20 @ 25 %
Greaves Horse Rasps.....American list, dis. 60 %

Fitting Machines.
Knox, ¼-inch Rolls.....$3.25 each } dis 35 %
Knox, 6-inch Rolls.....$3.60 each }
Eagle, ¾-inch Roll.....$2.15, dis 35 %
Eagle, 6¼-inch Roll.....2.85, dis 35 %
Crown, 4¼ in., $3.50; 6-in, $4.00; 8-in., $6 50 each, dis 35 %
Crown Jewel.....6-in, $3.50 each, dis 35 %
American, 5-in. $3; 6-in., $3.40; 7 in., $4.50 each, dis 35 %
Domestic Fluter.....$1.50 each, net
Geneva Hand Fluter, White Metal..₱ doz $12, dis 25 %
Crown Hand Fluter, Nos 1 $15; 2, $12.50; 3, $10, dis 30 %
Shepard Hand Fluter, No. 85.....₱ doz $15.30, dis 40 %
Shepard Hand Fluter, No. 110.....₱ doz $11, dis 40 %
Shepard Hand Fluter, No. 95.....₱ doz $8, dis 40 %
Clark's Hand Fluter.....₱ doz $15.00, dis 35 %
Combined Fluter and Sad Iron...₱ doz $15.00, dis 30 %
Buffalo.....₱ doz $10.00 dis 10 %

Fluting Scissors......dis 45 %

Forks.—Hay, Manure, &c., Asso. list.....dis 65&5 %
Hay, Manure, &c., Phila. list.....dis 60 @ 60&5 %
Plated, see Spoons.

Freezers, Ice Cream.
Shepard's Lightning.....dis 65 %

Fruit and Jelly Presses.
Enterprise Mfg. Co.....dis 20&10 @ 30 %
Reids.....₱ doz $4.50
Shepard's Queen City.....dis 40 %

Fry Pans.
Association List.....dis 75 @ 75&10 %

No.	0	1	2	3	4	5	6	7	8
₱ doz.	$3.75	4.70	5.30	5.95	6.55	7.50	8.75	10.00	11.25

Fuse.
Common Hemp Fuse, for dry ground.....₱ 1000 ft., $2.70
Common Cotton Fuse, for dry ground.....2.85
Single Taped Fuse, for wet ground.....4.75
Double Taped Fuse for very wet ground.....6.00
Triple Taped Fuse, for very wet ground.....7.25
Small Gutta Percha Fuse, for wat'r.....7.50
Large Gutta Percha Fuse, for wat'r.....12.00

Gauges.
Marking Mortise, &c.....dis 60&10 %
Wire, low list.....dis 10&10 %
Wire, Wheeler, Madden & Co.....dis 10 %
Wire, Morse's.....dis 50 @ 50&5 %
Wire, Brown & Sharpe's.....dis 10 @ 20 %

Gimlets.—Nail and Spike.....dis 50&10&5 %
"Eureka" Gimlets.....dis 40&10 %
"Diamond" Gimlets.....₱ gross $5.00
Double Cut, Shepardson's.....dis 45 @ 45&5 %
Double Cut, Ives'.....dis 60 @ 60&5 %
Double Cut, Douglass'.....dis 40&10 %
"Bee".....₱ gross $12, dis 25 @ 25&5 %

Glue.
Le Page's Liquid.....dis 25 @ 25&5 %

Glue Pots.
Tinned and Enameled.....dis 40&5 @ 40&10%
Family, Howe's "Eureka".....dis 40 %
Family, L. F. & C.'s "Handy".....dis 50 %

Grindstone Fixtures.
Sargent's Patent.....dis 70&10 %
Reading Hardware Co.....dis 30&10 %

Hack Saws.—See Saws.

Halters.—Covert's Pat. ¼ Jute.....dis 50&2 %
Covert's Hemp Horse and Cattle Tie.....dis 50&2 %
Covert's Jute Horse and Cattle Ties.....dis 60&10&2 %

Hammers.
Handled Hammers.
Maydole's.....List Dec. 1, 1885, dis 25 @ 25&1 0%
Buffalo Hammer Co.....
C. Hammond & Son.....
Humason & Beckley.....
Atha Tool Co.....
} List Jan. 15, '87 Dis. 50 @ 50& 10 %
Verree.....dis 5 %
Magnetic Tack, Nos. 1, 2, 3, $1.25, 1.50 & 1.75.dis 30&10 %
Nelson Tool Works.....dis 40&10 %
Warner & Nobles.....dis 20 @ 25 %
Peck, Stow & Wilcox.....dis 40 %
Sargent's.....dis 33⅓&10 %

Heavy Hammers and Sledges—
2 ℔ and under, 3 to 5 ℔, Over 5 ℔ } dis 70 @ 70 &5 %
Wilkinson's Smiths'.....10¼¢ @ 11¢ ₱ ℔

Hand Cuffs and Leg Irons.
Providence Tool Co., Hand Cuffs, $15.00 ₱ doz..dis 10%
Providence Tool Co. Leg Irons, $25.00 ₱ doz.....dis 10%
Tower's.....dis 25 %
Daley's Improved Hand Cuffs: 2 Hands, Polished, ₱ doz, $48: Nickeled, $57; 3 Hands, Polished, ₱ doz. $72: Nickeled, $84.....dis 20 %

Handles.
Iron, Wrought or Cast.—
Door or Thumb.

Nos.	0	1	2	3	4
Per doz.	$0.90	1.00	1.18	1.35	1.50

.....dis 60&10&10 %
Roggin's Latches.....₱ doz. 30¢ @ 35¢
Bronze Iron Drop Latches.....₱ doz. 70¢ net
Jap'd Store Door Handles—Nuts, $1.62; Plate, $1.10; no Plate, $0.88.....net
Barn Door.....₱ doz. $1.40, dis 10&10 %
Chest and Lifting.....dis 70 %

Handles, Wood—
Saw and Plane.....dis 40&10 @ 40&10&5 %
Hammer, Hatchet, Axe, Sledge, &c.....dis 35 %
Brad Awl.....₱ gross $2.00
Hickory Firmer Chisel, assorted.....₱ gross 4.50
Hickory Firmer Chisel, large.....₱ gross 5.00
Apple Firmer Chisel, assorted.....₱ gross 5.00
Apple Firmer Chisel, large.....₱ gross 6.00
Socket Firmer Chisel, assorted.....₱ gross 3.00
Socket Framing Chisel, assorted.....₱ gross 5.00
} dis 40 %
J. R. Smith Co.'s Pat. File.....dis 50 %
File, assorted.....₱ gross 2.75
Auger, assorted.....₱ gross 5.00
Auger, large.....₱ gross 7.00
} dis 40 @ 40&10 %
Patent Auger, Ives'.....dis 30&10 %
.ent Auger, Douglass'.....₱ set $1.25 net
Patent Auger, Swan's.....₱ set $1.00 net
Hoe, Rake, Shovel, &c.....dis 50&10 %

Cross Cut Saw Handles—
Arkins' No. 1 Loop, ₱ pair, 30¢ No. 3, 22¢; No. 2 and No. 4 Reversible, 22¢.
Boynton's Loop Saw Handles.....50¢, dis 60 %
Champion.....15¢

Hangers.
Barn Door, old patterns.....dis 60&10&10 @ 70 %
Barn Door, New England.....dis 60&10&10 @ 70 %
Samson Steel Anti-Friction.....dis 55 %
Orleans Steel.....d's 55 %
Hamilton Wrought Wood Track.....dis 55 %
U. S. Wood Track.....dis 65 %
Champion.....dis 60&10 %
Rider and Wooster, Medina Mfg. Co.'s list.....dis 70 %
Climax Anti-Friction.....dis 55 %
Climax Steel Anti-Friction.....dis 50 %
Zenito for Wood Track.....dis 55 %
Reed's Steel Arm.....dis 40 %
Challenge, Barn Door.....dis 50 %
Sterling Improved (Anti-Friction).....dis 65&10 %
Victor, No. 1, $15; No. 2, $16.50; No. 3, $18...dis 50&2&5
Charitree.....dis 50&5&5
Kidder's.....dis 50&10 @ 60 %
The "Boss".....dis 60

Best Anti-Friction.....dis 60 %
Duplex Wood Track).....dis 60 %
Terry's Patent.....₩ doz. pr. 3¼ lb. $10; 5 lb. $12.....dis 50 @ 50&5 %
Cronk's Patent....No. 4, $12; No. 5, $14.40. No. 6. $18 %.....dis 50&10 @ 50&10 %
Wood Track Iron Clad...₩ ft. 10¢. dis 50&10 @ 50&10 %
Carrier Anti-Friction.....dis 50&10&10
Architect.....₩ set $6.00, dis 20 %
Eclipse.....dis 20&10
Fel'x.....₩ set $4.50, dis 20 %
Richards'.....dis 50@50&10 %
Lane's Steel Anti-Friction.....dis 40&10 %
The Ball Bearing Door Hanger....dis 20&10 @ 25&10 %
Warner's Patent.....dis 20@20&10 %
Stearns' Anti-Friction.....dis 20 @ 20&10 %
Stearns' Challenge.....dis 25&10 @ 25&10&10 %
Faultless.....dis 40 @ 40&5 %
American.....₩ set $6: dis 20&10 %
Rider & Wooster, No. 1, 62½¢; No. 2, 75¢.....dis 40 %
Paragon, Nos. 1, 2 and 3.....dis 40&10 %
Paragon, Nos. 5, 5½, 7 and 8.....dis 20&10 %
Crescent.....dis 60@60&10 %
Nickel, Cast Iron.....dis 50 %
Nickel, Malleable Iron and Steel.....dis 40 %

Harness Snaps.—See Snaps.

Hatchets.—List Jan. 1, 1886.

Isaiah Blood.....dis 35 @ 40&5 %
Hunt's Shingling Lath and Claw.....dis 40&5 %
Hunt's Broad.....dis 40 %
Buffalo Hammer Co.....dis 40&10@50 %
Hurd's.....dis 40&5 @ 40&10&5 %
Yerges & Plumb.....40&5 @ 40&10 %
Wm. Mann, Jr., & Co.....d's 50 @ 50&5%
Underhill Edge Tool Co.....dis 40&5 @ 40&10 %
Underhill's Haines and Bright goods.....dis 33⅓ %
C. Hammond & Son.....dis 40&10 @ 50 %
Simmons.....dis 35 @ 40 %
Peck's.....dis 40&10 @ 40&10&5 %
Kelly's.....dis 50@50&5 %
Sargent & Co.....dis 50 %
Ten Eyck Edge Tool Co.....dis 40&10@40&10&5 %
Collins, following list.....dis 40 %
Shingling, Nos. 1 2 3.....₩ doz $5.50 $6.00 $6.50
Claw, Nos. 1 2 3.....₩ doz 6.00 6.50 7.00
Lathing Nos. 1 2 3.....₩ doz 5.50 6.00 6.50

Hay Knives.

Lightning.....Mfrs. price ₩ doz $18 d's 25 %; Jonber's Extras
Electric.....₩ doz $17; dis 33⅓ @ 40&10 %
Gem.....₩ doz $18; dis 33⅓@50&5 %
Wadsworth's.....dis 40&7½ @ 40&10 %
Carter's Needle.....₩ doz $11.50 @ $12. 0
Heath's.....₩ doz $13.50 @ $14.00

Hinges.

Wrought Iron Hinges—
Strap and T.....dis70&5 & 70&10
Screw Hook and Strap, 8, 10, 12 in.. ₩ lb.....34¢
Strap, 14 to 36 in. ₩ lb.....23¢
Heavy Welded Hook 8 to 12 in., ₩ lb.....33¢
14 in. & up. ₩ lb.....23¢
Screw Hook and Eye. ⅜ in.....₩ doz $2.45 dis 10%
⅝ in.....₩ doz $3.80
Rolled Blind Hinges, Nos. 22 and 24.....dis 50&10
Rolled Blind Hinges, Nos. 232 and 234.....dis 55&10 %
Rolled Plate.....dis 70&10
Rolled Raised.....dis 70&10
Plate Hinges 8, 10 & 12 in., ₩ lb.....4¼
"Providence" over 12 in., ₩ lb.....3¾

Spring Hinges—
Geer's Spring and Blank Butts.....dis 40
Union Spring Hinge Co's list. March. 1886...dis 20
Acme Crown, Empire and U S.....dis 30 %
American, Gem, and Star Japanned.....dis 20 %
American, Gem, and Star, Bronsed.....ne
Oxford, Bronze and Brass.....ne
Barker's Double Acting.....dis 20&10
Union Mfg. Co.....dis 25
Bommer's.....dis 30
Buckman's.....dis 12@20 %
Chicago.....dis 30 %

Gate Hinges—
Western.....₩ dos $4.40, dis 55
N. E.....₩ dos $7.00 dis 55
N. E. Reversible.....₩ dos $5 20. dis 55&10
Clark's, Nos. 1 2 3.....dis 60&10 @ 60&10&5
N. Y. State.....₩ dos $5.00. dis 55&10
Automatic.....₩ dos $12.50. dis 50
Common Sense.....₩ dos pair $4.50. dis 50
Seymour's.....dis 45&10 %
Shepard's, Nos. 1, 2, 10 and 20.dis 60&10@60&10&10 %
Shepard's, No. 5.....dis 60&10&60&10&10
Reed's Latch and dinges.....₩ dos sets $13, dis 50

Blind Hinges—
Parker.....dis 75&2 %
Palmer.....dis 50&5&10 %
Seymour.....dis 70&2 %
Nicholson.....dis 45&10 %
Huffer.....dis 50 %
Clark's, Nos. 1, 3, 5, 40 and 50.....dis 75&10&5 &80 %
Clark's Mortise Gravity.....dis 50 %
Sargent's, Nos. 1, 3, 5, 11, 13...dis 75&10@75&10&5 %
Sargent's No. 15.....dis 75&10&10 %
Reading's Gravity.....dis 75&10 @ 75&10&5 %
Shepard's "Noiseless." Nos. 50, 60, 65 & 75.....dis 75&10&5 %
Shepard's Niagara Gravity, Nos. 1, 3 and 5...dis 80 %
Shepard's Buffalo Gravity, Nos. 1, 3 and 5.....dis 80&2½ %
Shepard's Champion Gravity No. 75.....dis 80&10&5 %
Shepard's Steamboat Gravity, No. 10.....dis 80&20 %
Shepard's Acme Lull & Porter....dis 75&5&75&10 %
Shepard's O. S. Lull & Porter.....dis 70&10 %
Shepard's "Queen City" Reversible.....dis 70&10 %
Clark's Lull & Porter, Nos. 9, 1, 1½, 2, 2½, 3.....d's 75&10&2½ %
North's Automatic Blind Fixtures, No. 2, for Wood, $10.50; No. 3, for Brick, $13.50....dis 25&2 %

Hoes.

Handled—
Garden, Mortar, &c.....dis 65&5 %
Planter's, Cotton, &c.....dis 65&5 %
Warren Hoe.....dis 65 %
Magic.....₩ dos $4..

Eye—
D. & H. Scovil.....dis 15
Lane's Crescent Scovil Pattern.....d.s 45 %
Lane's Crescent Planters Pattern.....dis 45 & 5
Lane's Manor Blade, Scovil Pattern.....dis 45 %
Maynard S. & O. Pat.....dis 45&5
Sandusky Tool Co., " " .....dis 60
Hubbard & Co., " " .....dis 60 %
Bare " " .....dis 60 %
Grub.....dis 60 @ 60&10 %

Hog Rings and Ringers.

Hill's Improved Ringers.....₩ doz $5.50 @ 5.7
Hill's Old Style Ringers.....₩ doz $3.00 @ 3.2
Hill's Tongs.....₩ doz $5.50 @ 6.0
Hill's Rings.....₩ doz boxes $2.00 @ 2.2
Perfect Rings.....₩ doz boxes $1.75 @ 2.0
Perfect Ringers.....₩ doz $2.5
Blair's Hog Ringers.....₩ doz $2.6
Blair's Hog Rings.....₩ doz, 90¢ @ $1.00
Champion Ringers.....₩ doz $2.0
Champion Rings, Double.....₩ doz $2.2
Brown's Ringers.....₩ doz, $2.0
Brown's Rings.....₩ doz, $1.25 @ 1.3

Hoisting Apparatus

"Moore's" Hand Hoist, with Lock Brake.....dis 15 %
"Moore's" Differential Pulley Block.....dis 20 %

Holders, Tool.

Balz Pat.....₩ dos $4; dis 25 %

Hollow-Ware.

Iron—
Stove Hollow-Ware. Ground..dis 60&10@60&10&10 %
Stove Hollow-Ware. Unground dis 70&10@70&10&5 %
Enameled and Tinned Hollow Ware—
Kettles.....dis 70&10
Oval Boilers, Saucepans & Glue Pots.....d's 40&10 @ 10
Gray Enameled Ware.....dis 40 @ 40&5
Agate and Granite Ware.....dis 25 %
Rustless Hollow-Ware.....dis 50 @ 50&5 %
Galvanized Tea-Kettles—

Inch	6	7	8	9
Each	55¢	60¢	65¢	75¢

Silver Plated—
Reed & Barton.....dis 40&5
Meriden Brittania Co.....dis 40&5 %
Simpson, Hall, Miller & Co.....dis 40&5 %
Rogers & Brother.....dis 40&5 %
Hartford Silver Plate Co.....dis 40&5&5 %
William Rogers Mfg. Co.....dis 4 /&5&5 %

Hooks.

Cast Iron—
Bird Cage. Sargent's list.....dis 60&10&10
Bird Cage. Reading.....dis 60&10&10
Clothes Line. Sargent's list.....dis 66&10&10
Clothes Line. Reading list. dis 60&10 @ 60&10&10
Ceiling. Sargent's list.....dis55&10&10 %
Harness. Reading list.....dis 55&10 @ 55&10&10 %
Coat and Hat. Sargent's list.....dis 55&10 %
Coat and Hat. Reading.....dis 50&10 @ 50&10&10 %

Wrought Iron—
Cotton.....₩ doz $1.2
Cotton Pat. N. Y. Mallet & Handle Wks).....dis 30 %
Tassel and Picture T. & S. Mfg. Co.).....dis 50 %
Wrought Staples, Hooks, &c.....See Wrought Goods
Bench Hooks.....See Bench Stops

Wire—
Wire Coat and Hat. Gem, list April, 1886.....dis 45
Wire Coat and Hat. Miles' list April, 1886.....dis 45
Indestructible Coat and Hat.....dis. 45 %
Belt.....dis 75&10 @ 80
Grass.....₩ doz $2.0
Rush.....dis 55 @ 60
Whiffletree—Patent.....dis 55 %
Hooks and Eyes—Malleable Iron.....dis 70 %
Hooks and Eyes—Brass.....dis 60&10&10 %
Fish Hooks, American.....dis 50 %

Horse Nails.

Nos.	6	7	8	9	10	
Ausable	.28¢	26¢	25¢	24¢	23¢.	dis 25&10 @25&10&10 %
Clinton. Fin	.24¢	22¢	21¢	20¢	19¢	dis 40 @ 50 %
Essex	.28¢	26¢	25¢	24¢	23¢.	dis 25&10 @25&10&10 %
Putnam	.24¢	22¢	21¢	20¢	19¢.	dis 5& 10&2½&2½ %
Vulcan	.23¢	21¢	20¢	19¢	18¢.	dis 50&10
Northwest'n.	.26¢	23¢	22¢	21¢	20¢	d's 10&1 &5&5
Globe	.23¢	21¢	20¢	19¢	18¢.	dis 12½@50 %
A. C.	.25¢	23¢	22¢	21¢	20¢.	dis 25&10 @ 25& 10&5
C. B.-K	.25¢	23¢	22¢	21¢	20¢.	dis 25&10 @ 25& 10&5
Champlain	.28¢	26¢	25¢	24¢	23¢.	dis25&10&10 &5 %
New Haven	.28¢	26¢	25¢	24¢	23¢	dis25&10 @ 25&10&10 %
Saranac	.23¢	21¢	20¢	19¢	18¢.	dis 30&10 %
Champion	.25¢	23¢	22¢	21¢	20¢.	dis 10&10&10
Capewell	.28¢	26¢	25¢	24¢	23¢.	d's 35& @ 35&10
Star	.27¢	25¢	24¢	23¢	22¢.	dis 10&10@10&10 ½ %
Anchor	.23¢	21¢	20¢	19¢	18¢.	dis 30 & 5 %

Western.....16¢ per lb, all sizes
Empire Bronzed.....¼¢ per lb.

Horse Shoes.—See Shoes, Horse.

Hose, Rubber, competition.....75&10 @ 80 %
Standard.....dis 70 &70&10 %
Extra.....dis 6 &10&10 %
N. Y. B. & P. Co., Para.....dis 30&10 %
N. Y. B. & P. Co., Extra.....dis 50&5 %
N. Y. B. & P. Co., Dundee.....dis 60&10&10 %

Ice Picks, Chisels, &c.

Am. Ice Chisel Pol'd.....₩ doz $3.00, dis 2 @20&5 %
National Ice Chisel.....₩ dos $6.25, dis 20 %
Sovereign Ice Breakers.....₩ doz $6.25, dis 20 %
Dunlap's Ring Picks.....₩ doz $2.00 dis 15
Wood Head Picks Sargent's....₩ dos $1.60 dis 50&10
Iron Head Picks Sargent's.....₩ dos $1.25, dis 50&10
Ice Mallets Pick in handle.....₩ dos $2.00 dis 15
Ice Axes Small Cast or Mail...₩ dos $1.25 dis 20&10
Combination Ice Tools.....₩ doz $2.00 ne
Acme Ice Pick and Tongs..₩ gross $55.00 dis 50&10 %
Roger's Lightning Ice Chisel.....₩ gross $28.5

Ice Tongs.

Champion 8, 8, & Co.....₩ dos $4 00, dis 25&10 %
Family.....₩ dos $2.75, dis 20@25 %

Jack Screws.—See Screws.

Kettles.

Brass. 7 to 17 in., ₩ lb.	Spun 24¢	Stamped 22¢
Brass larger than 17 inches, ₩ lb.	26¢	24¢
Enameled and Tea Kettles	See Hollow Ware	

Keys.

Lock Assc'n list Dec 30. 1886.....dis 50&10 & 60&5 %
Eagle, Cabinet, Trunk and Padlock.....dis 33⅓&2 %
Hotchkiss' Brass Blanks.....dis 40
Hotchkiss' Copper and Tinned.....dis 40
Hotchkiss' Padlock and Cabinet.....dis 35
Ratchet Bed Keys.....₩ dos $4.00, dis 15 %

Knife Sharpeners.

Parsin's Applewood Handles.....₩ dos $6.00, dis 40 %
Parsin's Rosewood or Cocobolo...₩ dos $9.00, dis 40 %

Knives.

Wilson's Butcher Knives.....dis 20 @ 25
Ames' Butcher Knives.....dis 40
Nichols' Butcher Knives.....dis 40&10
Ames Shoe Knives.....dis 20&25
Ames Bread Knives.....₩ dos $1.50, dis 15 & 20
Moran's Shoe and Bread Knives.....dis 20
Hay and Straw.....See Hay Knives
Table and Pocket.....See Cutlery

Knobs.

Door Mineral.....65%&7 %
Door Por. Jap'd.....75&80%
Door Por. Por. Nickel.....$2.00 @ 2.25
Door Por. Porc. Nickel.....$2.00 @ 2.25
Drawer, Porcelain.....dis 55&10&10 & &10&10 %
Brackets, Door & Gong, list.....dis 50&10&10&10
Yale & Towne Wood Knobs, list Dec. 1885.....d's 40 %
Furniture Plain.....75¢ gross net dis 10
Furniture, Wood Screws.....dis 25&10
Bar. Rubber Tip.....dis 70&10&5
Picture, Judd's.....dis 60&10&10 @ 70
Picture, Sargent's.....dis 66&10 %
Picture, Bemacite.....d's 35&5 %
Shutter, Porcelain.....dis 55&10 %
Carriage, Japanned.....₩ gross 30¢, dis 60&10 %

Ladles.

Melting, Sargent's.....dis 55&10
Melting, Reading.....dis 35&10%
Melting, Monroe's Patent.....₩ doz. $4.00, dis 40%
Melting, P. S. & W.....dis 35&10 @ 40%
Melting, Warner's.....dis 30%

Lanterns.

Tubular, No 0, without Guards.....₩ dos $5.75
Tubular Liftwire No. 0 without Guards ₩ doz $8.50
Tubular, Hinge Tip No 0 without Guards, ₩ doz $6.25
Tubular Bottom Lift, without Guards ₩ doz $6.25
Tubular, U. S. Safety Lift Wire, no Guards, ₩ doz $5.00
Guards for Tubulars, add ₩ doz.....
Police, Small, $6.00. Med. $7.25; Large, $8.75. dis 20@25%
Porter's Tin R. R.....10 dis 20%

Lemon Squeezers.

Porcelain Lined, No. 1.....₩ doz. $6.00, dis 25&30 %
Wood, No. 2.....₩ doz. $3.00, dis 35 %
Wood, Common.....₩ doz $1.70 @ 1.75
Dunlap's Improved.....₩ doz. $3.75, dis 20 %
Jammis'.....No. 1, $5; 2, $9; 12, $18 ₩ doz dis 25&10 %
Jennings' "Star".....₩ doz $2.50
The "Boss".....₩ doz $2.50
Dean's.....Nos. 1, ₩ doz $6.50; 2, $3.25; 3, $1.90
Little Giant.....dis 50 @ 50&5 %
King.....dis 40&5 %

Lines.

Cotton and Linen Fish, Draper's.....dis 50 %
Draper's Chalk.....dis 60 %
Draper's Mason's Linen, 84 ft.. No. 1. $1.25; No. 2, $1.75; No. 3, $2.25; No. 4, $2.75; No. 5, $3.25..dis 25 %
Cotton Chalk.....dis 55 %
Samson. Cotton, No. 4, $2; No 4½, $2.50.....dis 10 %
Silver Lake, Braided Nos. 0, $6.00. No. 1, $6.50; No. 2, $7.00; No 3 $7.50 ₩ gross.....dis 25 %
Masons' Linen, No. 3½, $1.50; No. 4, $2; No. 4½, $2.50
Masons' Colored Cotton.....dis 45
Wire Clothes, No. 18, $5.75; No 19 $6 25; No. 20, $3.75.
Ventilator Cord, Parson Braided, White or Drab Cotton.....$7.50 ₩ doz. dis 20

Locks, Padlocks, Cabinet Locks, &c.

Door Locks, Latches, &c.—
List Dec. 30, '86, ched Feb. 2, '87,..dis 50&10 @ 60&5 %
Note.—Lower net prices often made.
Reading Hardware Co. (list Jan. 1, '86..dis 40@40&10 %
Livingston & Co.....dis 70 %
Perkins' Burglar Proof.....dis 60&25 %
Plate.....dis 33⅓&2 %
F. Many's "Extension Cylinder".....$10.50 ₩ doz
Barnes Mfg. Co.....dis 40 %
Yale Corrugated Key.....dis 33⅓ %
Dietz Flat Key.....dis 30 %
L. & C. Round Key Latches.....dis 30&10 %
L. & C. Flat Key Latches.....dis 33⅓&10 %
Romer's Night Latches.....dis 20 %
Yale new list.....dis 33⅓ %
"Shepardson" or "U. S."....dis 35 %
"Felter" or "American".....dis 40&10
Seed's N. Y. Hasp Lock.....dis 25

Cabinet—
Eagle, Gaylord Parker and Corbin..... List March. '86, revised Jan. 1, '85..dis33⅓&2 %
Deitz, Nos. 36 to 39.....dis 40 %
Deitz, Nos. 51 to 68.....dis 40 &10 %
Dietz, Nos. 86 to 96.....d's 30 %
Stoddard Lock Co.....dis 30 @ 33⅓ %
"Champion" Night Latches.....dis 40 %
Barnes Mfg. Co.....dis 40 %
Eagle and Corbin Trunk.....dis 25&2 %
"Champion" Cabinet and Combination....dis 33⅓ %
Yale.....dis 33⅓ %
Romer's.....dis 25 %

Padlocks—
List, Dec. 23, '84.....dis 65&10&2@—%
Yale Lock Mfg. Co.'s.....dis 2½ %
Eagle.....dis 25&2 %
Eureka, Eagle Lock Co.....dis 40&2 %
Romer's Nos 0 to 91.....d's 35 %
Romer's, Nos. 200 to 505.....dis 20 %
A. E. Dietz.....dis 40 %
"Champion" Padlocks.....dis 40 %
Hotchkiss.....dis 30 %
"Star".....dis 15 %
"Horse Shoe" ₩ doz. $9.....dis 40 %
Barnes Mfg. Co.....dis 40 %
Rock's.....dis 30 %
Brown's Patent.....dis 5 %
Brand Peerless.....dis 50 %
Fraim's Pat. Scandinavian new list (low)....dis 60 %

Lumber Tools.

Log Peavies, "Blue Line" Finish.....₩ doz $20.00
Log Peaves, Common Finish.....₩ doz $18.00
Steel Socket Pearies.....₩ doz $21.00
Mall, Iron Socket Peavies.....₩ doz $19.00
Cant Hooks, "Blue Line" Finish.....₩ doz $16.00
Cant Hooks, Common Finish.....₩ doz $14.00
Cant Hooks Mall. Socket Clasp, "Blue Line" Finish.....₩ doz $16.00
Cant Hooks, Mall. Socket Clasp Common Finish.....₩ doz $14.50
Cant Hooks, Clip Clasp, "Blue Line" Fin..₩ doz $14.00
Cant Hooks, Clip Clasp, Common Finish..₩ doz $12.00
Hand Spikes.....₩ doz 6 ft. $15.00; 8 ft.. $20
Pike Poles, Pike & Hook, 12 ft. 14 ft. 16 ft. 18 ft. 20 ft. ₩ doz.....$11.50 12.50 14.50 17.50 21.50
Pike Poles, Pike only. ₩ doz.....10.00 11.00 13.00 16.00 20.00
Pike Poles not Ironed. ₩ doz.....6.00 7.00 9.00 12.00 16.0
Corving Poles. ₩ doz.....14.00 15.00 17.00
Swamp Hooks.....₩ doz $18.00
Landing Hooks.....₩ doz $22.50
Skidding Tongs.....₩ doz $51.00
Log Binders.....₩ doz $26.00
Tempered Root Calks, 1 to 5 M, dis 25 %; 5 to 10 M dis 30 %
Square Steel Root Calks.....dis 40 %
Chain Rafting Dogs.....₩ 100 $12.50
Long Rafting Dogs...₩ 100. med., $10.00; large, $12.00
Timber Grapples.....₩ doz $30.00

Lustre

Four ounce Bottles.....₩ doz $1.75 ₩ gro. $17. 00

Mallets.

Hickory.....dis 2&10&2&10&10 %
Lignumvitæ.....dis 20&10&10 %
B & L. Block Co., Hickory and L. V...dis 50 @ 50&10 %

Mattocks.—Regular list.....dis 60&5 @ 60&10 %

Meat Cutters

Enterprise—Nos	1	2	3	4
₩ dos	$14.00	17.00	19.00	50.00—dis 45 %
Woodruff's	Nos.	100	150	
	₩ doz	$15.00	18.00—dis 45 %	
Champion	Nos.	200	300	400
	₩ dos.	$22.00	27.00	40.00—dis 45 %
Ladies' Pattern Nos	11	12	13	
	₩ dos	$27.00	33.00	45.00 dis 70 @ 5 %
American				dis
Nos.	1	2	3	4½
Each	$5.00	7.00	10.00	25.00 50.00 60.00
Enterprise				dis 3
Nos	10	12	22	32 42
Each	$3 00	2.50	4.00	6 00 1

Pennsylvania.....dis 40&10%

Nos.	1	2	3	00
₱ dos.	$24.00	28.00	36.00	28 00

Miles' Challenge..Nos 1 2
₱ dos. $22.00 30.00 40 00—d's 45@45&10 %
Home No. 1.....$26 ₱ doz, dis 55&10 %
Draw Cut..Nos.. 5 2 6 3
Each...$50.00 75.00 80.00 225.00—dis 20 @ 25 %
Beef Shavers Enterprise Mfg. Co.'s...dis 20&10 @ 30 %
Chadborn's Smoked Beef Cutter.....₱ doz, $66.00

Mincing Knives.
Am. Cd quality), ₱ gro, 1 blade, $7; 2 blades, $12; 3 blades, $18.....net
Lothrop's.....dis 20&10 %
Smith's. ₱ doz, Single, $2.00; Double, $3....dis 40@45 %
Knapp & Cowles.....dis 50&10@60 %

Molasses Gates.—Stebbins' Pat..dis 70@70 & 7½ %
Stebbins' Genuine.....dis 60 & 10&10 %
Stebbins' Tinned Ends.....dis 40&10 %
Chase's Hard Metal.....dis 50&10 %
Bush's.....dis 30 %
Lincoln's Pattern.....dis 66⅔&10 %
Weed's.....dis 30&10 %

Boss Nos.. 1 2 3 4
$7.00 8.00 9.00 10.00. ₱ dos, dis 60&10&10 %

Money Drawers.—₱ doz., $18 @ $20.

Muzzles.—Safety, ₱ dos. $3.....dis 25 %

Nails.....See Trade Report
Wire Nails list July 14, '87...dis 60&10&10@ 70 %
Wire Nails. Standard Penny.....₱ keg, $2.70 @ $2.80
Wire Carpet Nails.....See Tacks

Nail Puller.—Curtiss Hammer...₱ doz $9.00 net
Giant, No. 1.....₱ doz $30.00, dis 10 %
Pelican.....₱ doz $9 00, d's 25 %
Boss.....₱ doz $36, dis 30 %

Nail Sets.—Square.....₱ gro., $4.00 @ $4.25
Round.....gro. $3.25
Cannon's Diamond Point.....₱ gro. $12 dis 20 %

Nut Crackers.
Table (Humason & Beckley Mfg. Co.).....dis 40 %
Blake's Pattern.....₱ doz $2.00, dis 10 %
Turner & Seymour Mfg. Co.....dis 50 %

Nuts and Washers.

Size	¼	5-16	⅜	½	⅝	¾	1
Washers	7	5¾	4¾	4	3½	3⅛	3⅛

Nuts all kinds. 5¢ off list.
In lots less than 100 ℔, ₱ ℔, add ½¢, 1 ℔ boxes add 1¢ to list.

Oakum.
Government.....₱ ℔ 8½¢
U. S. Navy.....₱ ℔ 7¾¢
Savy.....₱ ℔ 7 ¢

Oilers.—Zinc and Tin.....dis 65 & 65&10 %
Brass and Copper.....dis 50&10@50&10&5 %
Malleable, Hammers' Improved, No 1, $3.60; No 2, $4.00; No. 3, $4.40 ₱ doz.....dis 10 @ 10&10 %
Malleable, Hammers, Old Pattern, same list...dis 40 %
Prior's Patent or "Paragon" Zinc.....dis 60&10&10 %
Prior's Patent or "Paragon" Brass.....dis 50 %
Olmstead's Tin and Zinc.....dis 60 %
Olmstead's Brass and Copper.....dis 50 %
Broughton's Zinc.....dis 60 %
Broughton's Brass.....dis 50 %

Packing, Steam.

Rubber—
Standard.....dis 60&10 @ 60 & 10&10 %
Extra.....dis 50&10 @ 60 %
N. Y. R. & P. Co., Standard.....dis 50&10&5 %
N. Y. R. & P. Co., Empire.....dis 70 %
N. Y. R. & P. Co. Salamander.....₱ ℔ 65¢, dis 30 %
Jenkins' Standard.....₱ ℔ 80¢, dis 35 %

Miscellaneous—
American Packing.....10¢ @ 11¢ ₱ ℔
Russia Packing.....14¢ ₱ ℔
Italian Packing.....13 @ 14¢ ₱ ℔
Cotton Packing.....15 @ 17¢ ₱ ℔
Jute.....7 @ 8¢ ₱ ℔

Padlocks.—See Locks.

Pails.
Galvanized Iron—

Quarts	10	12	14
Hill's Light Weight, ₱ doz	$2.75	3.00	3.25
Hill's Heavy Weight, ₱ doz	3.00	3.25	3.75
Whiting's	2.75	3.00	3.25
Sidney Shepard & Co	2.67		3.23
Iron Clad	2.75	3.00	3.25
Fire Buckets	2.75	3.25	3.50

Buckets see Well Buckets

Indurated Fibre Ware—
Star Pails, 12 qt.....₱ doz $1.75
Fire, Stable and Milk, 14 qt.....₱ doz $5.50

Pencils Faber's Carpenters'.....high list dis 50 %
Faber's Round Gilt.....₱ gro $5.25 net
Dixon's Lead.....₱ gro $4.50 net
Dixon's Lumber.....₱ gro $6.75 net
Dixon's Carpenters'.....dis 40&10 %

Picks.
Railroad, 5 to 6, $12.00; 6 to 7, $13.....dis 60 @ 60&10 %
Adze Eye, 5 to 6, $12.00; 6 to 7, $13.....dis 60 @ 60&10 %

Picture Nails.
Brass Head, Sargent's list.....dis 50&10&10 %
Brass Head, Combination list.....dis 50&10 %
Porcelain Head, Sargent's list.....dis 50&10&10 %
Porcelain Head, Combination list.....dis 40&10 %
Miles' Patent.....dis 40 %

Pinking Irons......₱ doz 65¢ net

Pipe, Wrought Iron.—List March 23 1887
1¼ and under, Plain.....dis 50 %
1¼ and under Galvanized.....dis 42½ %
1¼ and over, Plain.....dis 60 %
1¼ and over, Galvanized.....dis 50 %
Boiler Tubes, Iron.....dis 50 @ 52½ %

Planes and Plane Irons.
Wood Planes—
Molding.....dis 50 @ 50 & 5 %
Bench, First Quality.....dis 60 @ 60&5 %
Bench, Second Quality.....dis 40&10 %
Bailey's Stanley R. & L. Co.'s.....dis 30&10 %
Iron Planes—
Bailey's Stanley R. & L. Co.'s...dis 30&10@30&10&5 %
Miscellaneous Planes Stanley R. & L. Co.'s dis 20&10 %
Victor Planes Stanley R. & L. Co.'s...dis 20& 10 %
Steer's Iron Planes.....dis 35 & 35&5 %
Meriden Mal. Iron Co.'s.....dis 30&10@30&10&10 %
Davis's Iron Planes.....dis 30&10@30&10&10 %
Birmingham Plane Co.....dis 50@50&5 %
Gage Tool Co.'s Self-Setting.....dis 2 %
Plane Irons—
Plane Irons.....dis 20&10 %
Plane Irons, Butcher's.....$5.00 @ $5.25 %o f
Plane Irons, Buck Bros.....dis 30 %
Plane Irons, Middlesex Mfg. Co., "Baldwin Iron," Single and Cut.....dis 20 @ 25 %
Double.....dis 33⅓ @ 40 %
L. & I. J. White.....dis 25 %

Pliers and Nippers.
Burton's Patent.....dis 30&10 @ 40 %
Hall's Pat. Compound Lever Cutting Nippers, No. 2, 6 in., $13.50; No. 4, 7 in., $21.00 ₱ doz dis 20&10@ 33⅓&10 %
Humason & Beckley Mfg. Co.....dis 50@50&10 %
Gas Pliers.....dis 60 %
Gas Pliers, Custer's Nickel Plated.....dis 60&5 %
Eureka Pliers and Nippers.....dis 40 %
Russell's Parallel.....dis 25 %
P. S. & W. Cast Steel.....dis 20 %
P. S. & W. Tinners' Curving Nippers....add 6 % dis 10 %
Carew's Pat. Wire Cutters.....dis 20 %
Morrill's Parallel per doz., $12.....dis 30&5 %
Cronk's 8 in., $15; 10 in., $21.....dis 40 %

Plumbs and Levels.
Regular List.....dis 70&10@70&10&10 %
Disston's.....dis 45&10 %
Pocket Levels.....dis 70&10@70&10&10 %
Davis Iron Levels.....dis 30 %
Davis' Inclinometers.....dis 10&10 %

Poppers, Corn.
Round or Square, 1 qt.....₱ gro $10.50 @ $12
Round or Square, 2 qt.....₱ gro $24.50 @ $25

Post Hole and Tree Augers and Diggers.
Samson Post Hole Digger.....₱ doz $36.00, dis 25&10 %
Fletcher Post Hole Augers.....₱ doz $36.00 dis 20 %
Eureka Diggers.....₱ doz $16 @ $17
Reed's.....₱ doz $8.00 @ $9.00
Vaurnan's Post Hole, Auger, per doz, $24.00.. dis 40 %
Kohler's Little Giant.....₱ doz $18.00
Kohler's Hercules.....₱ doz $16.00
Kohler's New Champion.....₱ doz $9.00
Schneidler.....₱ doz $18
Ryar's Post Hole Diggers.....₱ doz $24
Cronk's Post Bars.....doz $80, dis 50&5 @ 50&10 %
Gibb's Post Hole Digger, ₱ doz $30....dis 40 @ 40&10 %

Potato Parers.
White Mountain.....₱ doz $5.00 @ 5.50
Antrim Combination.....₱ doz $8.00
Hoosier.....₱ doz $13.50

Pruning Hooks and Shears.
Disston's Combined Pruning Hook and Saw, ₱ doz $18.00.....dis 20&10 %
Disston's Pruning Hook.....₱ doz $12.00, dis 20&10 %
E. S. Lee & Co.'s Prunin Tools.....dis 40 %
Pruning Shears, Henry Pat...₱ doz $5.75 @ $4.00 net
Henry's Pruning Shears.....₱ doz $4.25 @ $4.50 net
Wheeler, M. & Co.'s Combination...₱ doz $12, dis 20 %
Dunlap's Saw and Chisel.....₱ doz $8.50, dis 30 %
J. Mallinson & Co.....No. 1, $5.25; No. 2, $7.25

Pulleys.—Hot House, Awning, &c.....dis 60&10 %
Japanned Screw.....dis 60&10 %
Brass Screw.....dis 60&10 %
Japanned Side.....dis 66⅔&10 %
Japanned Clothes Line.....dis 60&10 %
Empire Sash Pulley.....dis 55 & 60 %

Hay Fork, Solid Eye, $4.00; Swivel, $4.50 } dis 50&10&5 %

Hay Fork, "Anti Friction," 5 tn. Solid, $5.70...dis 50 %
Hay Fork, "F" Common and Pat. Bushed.....dis 20 %
Hay Fork, Tarbar Pat. Iron.....dis 20 %
Hay Fork, Reed's Self-Lubricating.....dis 60 %
Spade Rack.....dis 45 %
Tackle Blocks.....See Blocks

Pumps.—Cistern, Best Makers.....dis 50 @ 10&60 %
Pitcher Spout, Best Makers...dis 60&10 @ 60&10&10 %
Pitcher Spout, Cheaper Goods...dis 70&5 @ 70&10&5 %

Punches.
Saddlers' or Drive, good quality.....₱ doz 60¢ @ 65¢
Bemis & Call Co.'s Cast Steel Drive.....dis 50&5 %
Bemis & Call Co.'s Springfield Socket.....dis 60&5 %
Spring, good quality.....₱ doz $2.50 @ $2.60
Spring, Leach's Patent.....dis 15 %
Bemis & Call Co.'s Spring and Check.....dis 40 %
Solid Tinners'.....₱ doz $1.44, dis 55 %
Tinners' Hollow Punches.....dis 20&2 %

Rail.
Sliding Door, Wrt. Brass ₱ ℔ 35¢, dis 20 @ 70&5 %
Sliding Door, Bronzed Wrt. Iron.....₱ foot 7¢
Sliding Door Iron, Painted....₱ foot 4¢, dis 20&10&5 %
Barn Door Light.....Incn. ½ ¾ 1
Per 100 feet.....$2.50 3.00 4.40—dis 10 %
S. D. for N. E. Hangers—

	Small.	Med.	Large
Per 100 feet	$2.15	2.70	3.25 net

Terry's Wrought Iron, ₱ foot.....4½¢ @ 5¢
Victor Track Rail, 7¢ ₱ foot.....dis 50&2 %

Rakes.
Cast Steel.....dis 65&5 @ 70 %
Malleable.....dis 70 @ 70&5 %
Gibbs Lawn Rake.....$12 dis 40 %
Canton Lawn Rake.....$9 dis 40 %
Ft Madison Prize Row Brace and Peerless..dis 65&5 %
Fort Madison Steel Toots Lawn Rake, $6.....dis 25 %

Razors—J. R. Torrey Razor Co.....dis 20%
Wostenholme and Butcher.....$10 to $, dis 10 %

Razor Strops.
Genuine Emerson.....dis 60 @ 60&5 %
Imitation Emerson.....₱ doz $2.00, dis 30&10&5 %
Torrey's.....dis 20 %
Badger's Belt and Combination.....₱ doz $2
Lamont Combination.....₱ doz $4

Rivets and Burrs.
Copper.....dis 50, with Jobbers' Extras.
Iron, list November 17, 1887.....dis 50 %

Rivet Sets......dis 50&2 @ 50&10 %

Rods.—Stair, brass.....dis 20&2 %
Stair Black Walnut.....₱ doz 40¢

Rollers.
Barn Door, Sargent's list.....dis 60&10&10 %
Acme (Anti-Friction).....dis 55 %
Union Barn Door Roller.....dis 70 %

Rope.—Manufacturers' prices for large lots.

Manila	⅜ inch and larger	₱ ℔ 12½¢ net
Manila	⅜ inch	₱ ℔ 11½¢ net
Manila	¼ and 5-16 inch	₱ ℔ 11½¢ net
Manila Tarred Rope		₱ ℔ 10¢ net
Manila Hay Rope		₱ ℔ 10½¢ net
Sisal	⅜ inch and larger	₱ ℔ 9¾¢ net
Sisal	⅜ inch	₱ ℔ 10½¢ net
Sisal	¼ and 5-16 inch	₱ ℔ 10¾¢ net
Sisal, Hay Rope		₱ ℔ 9¾¢ net
Sisal, Tarred Rope		₱ ℔ 9¼¢ net
Sisal, Medium Lath Yarn		₱ ℔ 8½¢ net
Cotton Rope		₱ ℔ 15 @ 18¢ net
Jute Rope		₱ ℔ 7¢

Dis 1½ % for cash in 10 days.

Rules.
Boxwood.....dis 30&10 @ 30&10&10 %
Ivory.....dis 50 @ 55&10 %

Sad Irons.
From 4 to 10, at factory.....₱ 100 ℔ $2.75 @ $2.85
Self Heating.....₱ doz. $9.00 net
Self Heating, Tailors'.....₱ doz. $18.00 net
Gleason's Shield and Toilet.....dis 25 %
Mrs. Pott's Irons.....dis 40@40&5 %
Enterprise Star irons, new list, July 20, 1882....dis 40 %
Combined Fluter and Sad Iron...₱ doz. $15.00, dis 15 %
Fox Reversible, Self Fluter.....₱ doz., $24.00 net
Chinese Laundry (N. E. Butt Co.).....$1.50, dis 15 %
New England.....50, dis 15 %

Sand and Emery Paper and Cloth.
List April 19 1886.....dis 20@ 20&5 %
Sibley's Emery and Crocus Cloth.....dis 30 %

Sash Cord.
Common.....₱ ℔, 10¢ @ 11¢
Patent, good quality.....₱ ℔, 13¢ @ 13½¢
White Cotton Braided, fair quality.....₱ ℔ 25¢ @ 29¢
Common Russia Sash.....₱ ℔ 13½¢
Patent " " .....₱ ℔ 15¢
Cable Laid Italian " .....₱ ℔ 22¢ @ 23¢
India Cable Laid " .....₱ ℔ 19¢
Silver Lake, A Quality, White.....50¢, dis 10&10&5 %
Silver Lake, A Quality, Drab.....55¢, dis 10&10&5 %
Silver Lake, B Quality, White.....60¢, dis 20&10&5 %
Silver Lake, B Quality Drab.....60¢, dis 20&10&5 %
Silver Lake, C Quality, White (only).....37¢ @ 38¢
Sylvan Spring, Extra Braided, White.....34¢
Sylvan Spring, Extra Braided, Drab.....32¢
Semper Idem Braided, White.....30¢
Egyptian, India Hemp, Braided.....25¢
Samson, Braided, White Cotton....60¢ dis 30 @ 30&5 %
Samson, Braided, Drab Cotton....55¢ d's 30 @ 30&5 %
Samson, Braided, Italian Hemp....55¢ dis 30 @ 30&5 %
Samson Braided Linen.....80¢ dis 30 @ 30&5 %

Sash Locks.
Clark's No. 1, $10.00; No. 2, $8.00 ₱ gross.....dis 33⅓ %
Ferguson's.....dis 33⅓ %
Morris and Triumph, list Aug. 16, 1886.....dis 60 & 2 %
Victor.....60&10 & 2 %
Walker's.....dis 10 %
Attwell Mfg. Co.....dis 25 @ 33⅓ %
Reading.....dis 60⅔&10 @ 66⅔&10&10 %
Hammond's Window Springs.....dis 40 %
Common Sense, Jap'd, Cop'd and Br'sed..₱ gross $4.00
Common Sense, Nickel Plated.....₱ gross $10.00
Universal.....dis 30 %
Kempshall's Gravity.....dis 60 %
Kempshall's Model.....dis 60@60&10 %
Corbin's Daisy, list February 15, 1886.....dis 70 %
Payson's Perfect.....dis 50&10&5 @ 60 %
Huguniu's New and Improved Adjustable Sash Balances, list Jan. 5, 1887.....dis 25& & 2 %
Huguniu's New Sash Locks, list Jan. 5, '87.dis 25&5&2 %
Stoddard "Practical".....dis 10 %
Iron Patent.....dis 55 @ 55&5 %
Lieseche's Nos. 100 & 110 ₱ gro. $8; 105, $10, dis 20&10 %
Davis, Bronze, Barnes Mfg. Co.....dis 50 %

Sash Weights.
Solid Eyes.....₱ ton. $25

Sausage Stuffers or Fillers.
Miles' "Challenge".....₱ dos. $20, dis 50@50&5 %
Perry.....₱ dos. No. 1, $15; No. 0, $21, dis 50@50&5 %
Draw Cut No. 4.....each, $30.00, dis 20 %
Enterprise Mfg. Co.....dis 20&10 @ 30 %
Silver's.....dis 40&10 %

Saws.
Disston's Circular....dis 45@45&5 %
Disston's Cross Cuts, d's 45@45&5 %
Disston's Hand.....dis 25@25&5 %
} Extras some times given by jobbers.

Atkins' Circular.....dis 50 %
Atkins' Silver Steel Diamond X Cuts.....₱ foot 75 ¢
Atkins' Concave Tooth Dexter X Cuts.....₱ foot 55 ¢
Atkins' Special Steel Diamond X Cuts.....₱ foot 32 ¢
Atkins' Champion and Electric Tooth X Cuts.....₱ foot 30 ¢
Atkins' Hollow Back X Cuts.....₱ foot 21 @ 22¢
Atkins' Shingle, Mulay, Drag, &c.....dis 40 %
W. M. & C., Hand.....dis 30&5 @ 30&10 %
W. M. & C. Champion X Cuts, Regular ₱ foot .24@28¢
W. M. & C. X Cuts, Thin Back.....₱ foot 27¢ @29¢
Peace Circular and Mill.....dis 45&10 %
Peace Hand Panel and Rip....dis 20&10 @ 20&10&10 %
Peace Cross Cuts, Standard.....₱ foot 25¢
Peace Cross Cuts, Thin Back.....₱ foot 27¢@28¢
Richardson's Circular and Mill.....dis 45 @ 45&10 %
Richardson's X-Cuts, No. 1, 30¢; No. 2, 27¢; No. 3, 24¢

Hack Saws—
Griffin's Hack Saws, complete.....dis 40&10 @ 50 %
Griffin's Hack Saw, Blades only.....dis 40&10 @ 50 %
Star Hack Saws and Blades.....dis 25 %
Diamond Hack Saws and Blades.....dis 25 %
Eureka and Crescent.....dis 25 %

Saw Frames.
White Vermont.....₱ gro $9 @ $10
Red, Polished, and Varnished....₱ doz $1.50, dis 25 %

Saw Sets.
Stillman's Genuine....₱ dos $5.00 and $7.75, dis 40&5 %
Stillman's Imita..₱ doz $3.25 and $5.25, dis 40&5@40&10%
Common Lever.....₱ dos $2.00, dis 40&5 %
Morrill's No. 1, $15.00; Nos. 3 & 4, $24...dis 40&10@50&
Leach's.....No. 0, $8.00; No. 1 $15.00, dis 15 & 20 %
Nash's.....dis 20&10 @ 20&10&10 %
Hammer, Hotchkiss.....$5.50, dis 10 %
Hammer, Bemis & Call Co.'s new Patent...dis 30&5 %
Bemis & Call Co.'s Lever and Spring Hammer..dis 30&5 %
Bemis & Call Co.'s Plate.....dis 10 %
Bemis & Call Co.'s Cross Cut.....dis 12½ %
Aiken's Genuine.....$13 00, dis 50&10 %
Aiken's Imitation.....$7.00, dis 50&5 %
Hart's Patent Lever.....dis 20 %
Disston's, Star, $9, No. 15, $5.50, dis 20&10@20&10&10 %
Atkins Lever.....per dos No. 1 $6.00. No. 2, $9.00.
Atkins' Criterion.....per doz $7.00 @ $ .50
Croissant, Keiler), No. 1, $15.00; No. 2, $24.00, dis 33⅓&10 %

Saw Tools.
Atkins Perfection.... $15.00; Excelsior $6.00 ₱ doz.

Scales.
Hatch, Counter, No. 171, good quality.....₱ dos $21
Hatch, Tea, No. 161.....₱ dos $6.75 @ $7.00
Union Platform, Plain.....$2.30 @ 2.35
Union Platform, Striped.....$2.40 @ 2.50
Chatillon's Grocers' Trip Scales.....dis 50 %
Chatillon's Eureka.....dis 25 %
Chatillon's Favorite.....dis 40 %
Family, Turnbull's.....dis 30@30&10 %

Scale Beams.
Scale Beams, List of Jan. 12, 82..dis 50&10@50&10&5 %
Scale Beams, Custer.....dis 30@33⅓ %
Chatillon's No. 1.....dis 40 %
Chatillon's No. 2.....dis 50 %

Scrapers.
Adjustable Box Scraper (S. R. & L. Co.'s)..$8.50, dis 30&10 %
Box, 1 Handle.....₱ dos $4.00, dis 10 %
Box, 2 Handle.....₱ dos $6.00, dis 10 %
Defiance Box and Ship.....dis 20&10 %
Foot.....dis 50&10@60 %
Ship, Common.....₱ dos $3.50 net
Ship, Providence Tool Co.....dis 10 %

Screen Window and Door Frames.
Porter's Pat. Window and Door Frame...dis 33⅓&10 %
Screen Corner Irons Warner's....dis 33⅓ @ 33⅓&10 %
Stearns' Frames and Corners.....dis 20&10 %

Screw Drivers.
Douglas Mfg Co.....dis 20&10&10 %
Disston's.....dis 45&10 %
Disston's Patent Excelsior.....dis 45&10 %
Buck Bros.....dis 30 %
Stanley R. & L. Co.'s Varnished Handles....dis 65&10 %
Stanley R. & L. Co.'s Black Handles.....dis 60&10 %
Sargent & Co.'s No. 1 forged Blade.....dis 70 & 10&10 %
Sargent & Co.'s No. 20.....dis 66⅔&10&10 %
Sargent & Co.'s Nos. 40 & 30, Cast Steel.....dis 60&10 %
Sargent & Co.'s No. 60, Round Blade.....dis 70&10 %
Knapp & Cowles' No. 1.....dis 60&20 @ 70 %
Knapp & Cowles' No. 1 Extra.....dis 60 @ 60&10 %
Knapp & Cowles No. 00 & 4.....dis 50&5 @ 50&10 %
Stearns'.....dis 25&10&5 %
Gay & Parsons.....dis 35 %
Champion.....dis 25 %
Clark's Patent.....dis 30 @ 33⅓ %
Crawford's Adjustable.....dis 30 %
Ehrich's Socket and Ratchet.....dis 25 @ 25&10 %
Allard's Spiral new list.....dis 25 %
Kolb's Common Sense.....₱ doz $6, dis 25&10 %

Syracuse Screw-Driver Bits.....dis 30 & 30&5 %
Screw Driver Bits.....₩ doz. 50¢ @ 75¢
Screw Driver Bits, Parr's .....₩ gro. 6.25
Pray's Hol. Hdle. Sets, No. 3, $12.....dis. 25 @ 25 & 10 %
P. D. & Co.'s, all Steel.....dis 50 %

Screws
Wood Screws—List, Brass, Jan 27; Iron, July 1, 1887
Flat Head Iron.....dis 70 %
Round Head Iron.....dis 65 %
Flat Head Brass.....dis 65 %
Round Head Brass.....dis 60 %
Flat Head Bronze.....dis 65 %
Round Head Bronze.....dis 60 %
} Less than often given by jobbers.

Machine—
Flat Head, Iron.....dis 55 ,
Round Head, Iron.....dis 50 %
Bench and Hand—
Bench, Iron.....dis 55&10 @ 55&10&10 %
Bench, Wood, Beech.....₩ doz $2.25
Bench, Wood, Hickory.....dis 20&10 %
Hand, Wood.....dis 25&10 @ 25&10&5 %
Lag, Blunt Point .....dis 70 %
Coach and Lag, Gimlet Point.....dis 66⅔@66⅔&5 %
Bed.....dis 25&5 %
Hand Rail, Sargent's.....dis 66⅔&10 %
Hand Rail, Humason, Beckley & Co.'s..dis 70&10@75 %
Hand Rail, Am. Screw Co.....dis 75 %
Jack Screws, Millers Falls list.....dis 50 @ 50&5 %
Jack Screws, P. S. & W.....dis 35 %
Jack Screws, Sargent.....dis 60&10 @ 60&10&5 %
Jack Screws, Stearns'.....dis 40 @ 40&10 %

Scroll Saws.
Lester, complete, $10.00.....dis 25 %
Rogers, complete, $4.00.....dis 25 %

Scythe Snaths......dis 50&10 @ 60 %

Shears.
American (Cast) Iron.....dis 75&10 @ 75&10&5 %
Pruning.....See Pruning Hooks and Shears
Barnard's Lamp Trimmers.....₩ doz $3.75
Tinners'.....dis 20&2 %
Seymour's, List, Dec.,1881 dis 60&10&10@60&10&10&5 %
Heinsch's, List, Dec.,1881 .dis 60&10&10@60&10&10&5 %
Heinsch's Tailor's Shears.....dis 33⅓ %
First quality C. S. Trimmers.....dis 80@80&10 %
Second quality C. S. Trimmers.dis 80&10@80&10&10 %
Acme Cast Shears.....dis 10&10 %
Diamond Cast Shears.....dis 10 %
Clipper.....dis 10&10 %
Victor Cast Shears.....dis 75&10@75&10&5 %
Howe Bros. & Hulbert. Solid Forged Steel.....dis 40 %
Cleveland Machine Co., Solid Steel Forged.....dis 70 %

Sheaves.
Sliding Door—
M. W. & Co., list Jan. 1, 1887. ...dis 50&10 @ 60&5 %
R. & E., list Dec. 18, 1885.....dis 55&2 %
Corbin's list.....dis 60&10&2 %
Patent Roller.....dis 60&10&2 %
Patent Roller, Hatfield's .....dis 75 %
Russell's Anti-Friction, list Dec. 18, 1885..dis 60&2
Moore's Anti-Friction.....dis 60
Sliding Shutter—
R. & E. list Dec. 18, 1885.....dis 60&10&2 %
Sargent's list.....dis 60&10 %
Reading list.....dis 60&10&10 %

Ship Tools.
L. & I. J. White.....dis 20&5 %
Albertson Mfg. Co.....dis 25 %

Shoes, Horse, Mule, &c.
Horse—
Burden's, Perkins', Phœnix, at factory.....$4.00
Mule—Add $1 ₩ keg to above prices.
Ox, Wrought—
Ton lots.....₩ ℔ 9¢
1000 ℔ lots.....₩ ℔ 9½¢
500 ℔ lots.....₩ ℔ 10¢

Shot.—(*Eastern prices, 2¢ off, cash, 5 days.*)
Drop, ₩ bag, 25 ℔.....$1.50
Drop, ₩ bag, 5 ℔.....35
Buck and Chilled, ₩ 25 ℔ bag.....$1.75
Buck and Chilled; ₩ 5 ℔ bag.....40
(*Western prices, 2¢ off, cash, 5 days.*)
Drop Shot, ₩ bag, 25 ℔ .....
Drop Shot, ₩ bag, 5 ℔.....
Buck and Chilled Shot, ₩ bag, 25 ℔ ...
Buck and Chilled Shot, ₩ bag, 5 ℔.....
} See Trade Report.

Shovels and Spades.
Ames' Shovels, Spades, &c., list Nov. 1, 1885....dis 20 %
NOTE.—Jobbers frequently give 5 @ 7½ % extra on above.
Griffith's Black Iron.....dis 50&10 %
Griffith's C. S.....dis 50&10@60&5 %
Griffith's Solid Cast Steel R. R. Goods.....dis 20 %
Old Colony (Sanford Fork & Tool Co).....dis 20 %
St. Louis Shovel Co.....dis 15 @ 15&7½ %
Hussey, Binns & Co.....dis 15 @ 25 %
Hubbard & Co.....dis 20@20&7½ %
Lehigh Mfg. Co.....dis 50@10 %
Payne Fetterhoff & Son, list January, 1886....dis 30 %
Remington's (Lowman's Patent).....dis 30&10 @ 40 %
Rowland's, Black Iron.....dis 50&10 %
Rowland's Steel.....dis 60 @ 60&5 %

Shovels and Tongs.
Iron Head.....dis 60&10@60&10&5 %
Brass Head.....dis 60&10&10 %

Skeins. Thimble.
Western list.....dis 75 @ 75&10 %
Columbus Wrt. Steel, list Nov. 1, 1887.....dis 20 %

Sieves.
Buffalo Metallic, S. S. & Co., new list.....dis 50&25 %
Barler Flour Sifters .....₩ doz $2.00
Smith's Adjustable Sifters.....₩ doz $2.25
Smit's Adjustable Milk Strainer.....₩ doz $2.00
Smith's Adjustable F. & C. Strainer.....₩ doz $1.75

Sieves, Wood-n rim—	Iron.	Plated.
Mesh 13, Nested. ₩ doz.	70¢	90¢
Mesh 20, Nested. ₩ doz.	85¢	$1.00
Mesh 24, Nested. ₩ doz.	$1.00	1.10

Slates.—School, by case.....dis 50 @ 50&10 %

Snaps, Harness, &c.
Anchor (T. & S. Mfg Co.).....dis 65 %
Fitch's Bristol.....dis 50&10 %
Hotchkiss.....dis 10 %
Andrews.....dis 50 %
Sargent's Patent Guarded.....dis 70&10&10 %
German, new list.....dis 40&10 %
Covert.....dis 50&2 %
Covert, New Patent.....dis 50&5&2 %
Covert New R. B.....dis 60@2 %
Covered Spring.....dis 60&10&10 %

Soldering Irons.
Covert's Adjustable. list Jan. 1, 1886.....dis 35&2 %

Spoke Shaves.—Iron.....dis 45 %
Wood.....dis 30 %
Bailey's (Stanley R. & L. Co.).....dis 40&10 %
Stearns'.....dis 20&10 @ 30 %

Spoke Trimmers.
Bonney's.....₩ doz $10.00, dis 50 %
Stearns'.....dis 20&10 %
Ives'.....No. 1, $15.00; No. 2, $12.00 ₩ doz, dis 55&10 %
Douglass'.....₩ doz $9.00, dis 20 %

Spoons and Forks.
Tinned Iron—
Basting, Central Stamping Co.'s list. dis 70@70&10 %
Solid Table and Tea, Central Stamping Company's list.....dis 70@ 70&10 %
Buffalo, S. S. & Co.....dis 33⅓&2 %

Silver-Plated—
Meriden Brit. Co., Rogers.....dis 50&5 %
C. Rogers & Bros.....50&5 %
Rogers & Bro .....50&5 %
Reed & Barton .....dis 50&5 @ 50&10&5 %
Wm. Rogers Mfg. Co. .....dis 50&10 @ 60 %
Simpson, Hall, Miller & Co.....dis 50&10&5 @ 60 %
Holmes & Edwards Silver Co.....dis 50&10&5@60 %
H. & E. Silver Co. Mexican Silver.....dis 50&5 %
H. & E. Silver Co., Durham Silver .....dis 50&5 %
German Silver.....dis 50 @ 50&5 %
German Silver, Hall & Elton.....dis 40&5 %
Nickel Silver.....dis 50&5@50&10&5 %, cash
Britannia.....dis 55 %

Springs.
Elliptic, Concord, Platform and Half Scroll.....dis 60 @ 60&5 %
Cliff's Bolster Springs .....dis 20 %

Squares.
Steel and Iron.....
Nickel Plated .....} .....dis 70&10 %
Try Square and T Bevels.....dis 60&10&10 @ 70 %
Disston's Try Square and T Bevels.....dis 45&10 %
Winterbottom's Try and Miter.....dis 30&10 %

Staples.
Fence Staples, Galvanized.....₩ ℔, 4 @ 4¼¢
Fence Staples, Plain .....₩ ℔, 3 @ 3¼¢

Steelyards......dis 40&10@50&5 %

Stocks and Dies.
Blacksmith's, Waterford Goods....dis 30&5 @ 30&10 %
Lightning Screw Plate.....dis 25 @ 30 %
Reece's New Screw Plates.....dis 33⅓ @ 33⅓&5 %

Stone.
Hindostan No. 1, 3¢; Axe, 3½¢; Slips No. 1, 5¢..
Sand Stone.....₩ ℔, 2¢
Washita Stone, Extra.....₩ ℔, 1 @ 22¢
Washita Stone, No. 1.....₩ ℔, 15 @ 16¢
Washita Stone, No. 2.....₩ ℔, 11 @ 12¢
Washita Slips, No. 1, Extra.....₩ ℔, 40 @ 42¢
Washita Slips, No. 1.....₩ ℔, 30 @ 32¢
Arkansas Stone, No. 1, 4 to 6 in.....₩ ℔, $1.35
Arkansas Stone, No. 1, 6 to 9 in.....₩ ℔, $1.75
Turkey Oil Stone.....4 to 8 in., ₩ ℔, 40¢
Turkey Slips.....₩ ℔, $1.00 @ $1.50
Lake Superior, Chase.....₩ ℔, 16¢
Lake Superior Slips, Chase.....₩ ℔, 31@32¢
Seneca Stone, Red Paper Brand, ₩ ℔.....18 @ 20¢
Seneca Stone, High Rounds, ₩ ℔.....20 @ 25¢
Seneca Stone, Small Whets, ₩ gro.....$24.00

Stove Polish.
Joseph Dixon's.....₩ gro $6.00, dis 10 %
Gem.....₩ gro $4.50, dis 10 %
Gold Medal.....₩ gro $6.00, dis 25 %
"Mirror".....₩ gro $6.00, dis — %
Lustro.....₩ gro $4.75 net
Ruby.....₩ gro $3.75 net
Rising Sun, 5 gro. lots.....₩ gro $5.50
Dixon's Plumbago.....₩ ℔ 8¢ net
Boynton's Noon Day, ₩ gro.....$5.00
Parlor Pride Stove Enamel.....₩ gross, $13
Yates' Liquid, 2 3 5 10 gal. cans
₩ gal.. $0.90 .80 .70 .60
Yates Standard Paste Polish, 10-lb cans, per lb., 15 ¢
Jet Black.....₩ gro $3.50
Japanese .....₩ gro $3.50
Fireside.....₩ gro $2.50

Tacks, Brads, &c.
List Jan 2 1888.
American Iron Carpet Tacks.....dis 72½&10&2 %
Steel Carpet Tacks.....dis 72½&10&2 %
Swedes Iron Carpet Tacks.....dis 72½&10&2 %
American Iron Cut Tacks.....dis 70&10&2 %
Swedes Iron Tacks .....dis 67½&10&2 %
Swedes Iron Upholsterers' Tacks...dis 67½&10 v 2 %
Tinned Swedes Iron Tacks.....dis 67½&10& %
Tin'd Swedes Iron Upholsters' Tacks.dis 67½ & 10 & 2 %
Gimp and Lace Tacks.....dis 67½ & 10 & 2 %
Tinned Gimo and Lace Tacks.....dis 67½ & 10 & 2 %
Swedes Iron Trimmers' Tacks ....dis 67½&1t & 2 %
Swedes Iron Miners' Tacks .....dis 67½&10&2 %
Swedes Iron Bill Posters' or Railroad Tacks.....dis 67½&10&2 %
Swedes Steel Tacks, all kinds (Swedes Iron price list).....dis 72½&10&2 %
Copper Tacks.....dis 3 ½&10&2 %
Copper Finishing Trunk and Clout Nails.....dis 33½&10&2 %
Finishing Nails .....dis 60&10&2 %
Trunk and Clout Nails .....dis 60&10&2 %
Tinned Trunk and Clout Nails.....dis 60&10&2 %
Basket Nails.....dis 60&10&2 %
Common and Patent Brads.....dis 60&10 & 2 %
Hungarian Nails.....dis 6 0&10&2 %
Chair Nails.....dis 60&10&2 %
Zinc Gaizers' Points.....dis 4t &10&2 %
Cigar box Nails.....dis 45&1 & 2 %
Picture Frame Points.....dis 45&10&2 %
Looking-Glass Tacks.....dis 45&10&2 %
Leatnered Carpet Tacks.....dis 45&10& 2 %
Brush Tacks.....dis 45&10&2 %
Shoe Finders'.....List Jan. 2, 1888 dis 10 @ 10&5 %
Lining and Saddle Nails, List Jan. 1, 1886:
Silvered.....dis 30&10&10 %
Japanned.....dis 20&10&10 %
Double-pointed Tacks.....85 %
Wire Carpet Nails .....dis 50&10 %
Steel Wire Brads, R. & E. Mfg. Co.....dis 50&10 %

Extra 10 % often given.

Tap Borers.
Common and Ring .....dis 20&10 %
Ives' Tap Borers .....dis 33⅓&5 %
Enterprise Mfg. Co.....dis 20&10 @ 30 %
Clark's.....dis 33⅓ @ 35 %

Tapes, Measuring.—American.....dis 25&10 %
Spring.....dis 40 %
Chesterman's.....Regular list dis 25 @ 30 %

Thermometers.—Tin Case.....dis 30 @ 30&10 %

Thimble Skeins.—See Skeins.

Ties, Bale.
Steel Wire, Standard list .....dis 50&10&5 %

Tinners' Shears, &c.
Shears and Snips (P. S. & W.).....dis 20 @ 25 %
Punches—See Punches.
Snips, J. Mallinson & Co.....dis 33⅓ %

Tinware.
Stamped, Japanned & Pieced, list Jan. 20, 1887.....dis 70 @ 70&10&5 %

Tobacco Cutters.
Enterprise Mfg. Co. (Champion).....dis 20&10 @ 40 %
Wood Bottom.....₩ doz $5.00 @ $5.25
All Iron .....₩ doz $4.25
Nashua Lock Co.'s.....₩ doz $18.00, dis 50 @ 55 %
Wilson's.....dis 55 %
Clipper (Sargent & Co.).....₩ doz $24, dis 50&10&10 %
Acme.....₩ doz $20.00, dis 40 %

Transom Lifters
Wollensak's Patent Iron Bronsed.....d's 50 %
Reiber's Bronzed Iron Rods list Jan. 1, 1887, d's 50&2 %
Reiber's Real Bronze or Nickel Plate. list Jan. 1, 1887 .....dis 50&2 %
Excelsior.....dis 50&10&2 %
Shaw's.....dis 50&10
Payson's Universal.....dis 40 %
Crown and Star.....dis 50 %

Traps.
Game—
Newhouse.....dis 35 @ 40&5 %
Oneida Pattern.....dis 60&10&10 @ 70 %
Game, Blake's Patent.....dis 40&10&5 %
Mouse and Rat—
Mouse, Wood. Choker.....₩ doz holes. 11@12¢
Mouse, Round Wire.....₩ doz $1.50, dis 10 %
Mouse, Cage, Wire.....₩ doz $2.50, dis 10 %
Mouse, Catch-'em-alive.....₩ doz $2.50, dis 15
Mouse, "Bonanza".....₩ gross $10 net
Mouse, Delusion.....₩ gross $18.00, dis 15 %
Rat, "Decoy".....₩ gross $10.00, dis 10 %
Ideal.....₩ gross $10
Cyclone.....₩ gross $5.25
Hotchkiss Metallic Mouse, 5 hole traps....₩ doz 90¢
To full cases.....₩ doz 75¢

Trowels
Lothrop's Brick and Plastering.....dis 25
Reed's Brick and Plastering.....dis 15 %
Disston's Brick and Plastering.....dis 25 @ 25&10 %
Peace's Plastering.....dis 25 %
Clement & Maynard's.....dis 20 %
Rose's Brick.....dis 15 @ 20 %
Brade's Brick.....dis 25 %
Worrall's Brick and Plastering.....dis 20
Garden.....dis 70 %

Triers.—Butter and Cheese.....dis 25 %

Trucks, Warehouse, &c.
B. & L. Block Co.'s list, 1882.....dis 40 %

Tubes. Boiler.—See Pipe

Twine.

	BC.	B.
No. 9, Flax Twine, ¼ and ½ ℔ Balls.	23¢	31¢
No. 12, " " ¼ and ½ "	21½¢	30¢
No. 18, " " ¼ and ½ "	18½¢	29¢
No. 24, " " ¼ and ½ "	20¢	29¢
No. 36, " " ¼ and ½ "	17½¢	28¢
No. 264, Mattrass, ¼ and ½ "		48¢
Chalk Line, Cotton, ¼ ℔ Balls.		25¢
Mason Line, Linen, ¼ "		55¢
2-Ply Hemp, ¼ and ½ ℔ Balls (Spring Twine)		13¢
3-Ply Hemp, 1 ℔ Balls		12½¢
3-Ply Hemp, 1½ ℔ Balls		11½¢
Cotton Wrapping, 5 Balls to ℔		15¢ @ 18¢
2, 3, 4 and 5 Ply Jute, ½ ℔ Balls		9½¢
Wool		5½¢ @ 6¢
Paper		13¢ @ 14¢
Cotton Mops—6, 9, 12 and 15 ℔ to doz		18¢

Vises.
Solid Box.....dis 50&10&5 @ 60 %
Parallel—
Fisher & Norris Double Screw.....dis 15&10 %
Stephens'.....dis 25 %
Parker's.....dis 20 @ 25 %
Wilson's.....dis 55 %
Howard's.....dis 40 %
Bonney's.....dis 40%
Millers Falls.....dis 40 @ 40&10 %
Trenton.....dis 40&5 @ 40&10 %
Merrill's.....dis 15@20 %
Sargent's.....dis 60&10&10 %
Backus and Union.....dis 40 %
Double Screw Leg.....dis 15&10 %
Prentiss.....dis 20&5 @ 25 %
Simpson's Adjustable.....dis 40 %
Saw Filers—
Bonney's, Nos. 2 & 3.....₩ doz $15.00, dis 40 %
Stearn's.....dis 33⅓&10 @ 33⅓&10&10 %
Stearn's Silent Saw Vises.....dis 33⅓ @ 35 %
Sargent's.....dis 60&10&10 %
Hopkins'.....₩ doz $17.50, dis 10 %
Reading.....dis 40&10 %
Wentworth.....dis 20&10 %
Combination Hand Vise.....₩ gro, $42.00
Cowell Hand Vises.....dis 20 %
Bauer's Pipe Vises.....dis 10 %

Wagon Boxes.
Per lb.....2¾¢

Washer Cutters.
Smith's Patent.....₩ doz $12.00, dis 50&10&10 %
Johnson's.....₩ doz $11.00, dis 33⅓ %
Penny's .....₩ doz Pol. $14; Jap'd. $16..dis 55 %
Appleton's .....₩ doz $16.00, dis 60&10 %
Bonney's .....dis 30&10 %

Washers.—See Nuts and Washers.

Wedges.—Iron.....₩ ℔ 3½¢
Steel.....₩ ℔ 4 ¢

Well Buckets. Galvanized.
Hill's.....₩ doz ..12 qt., $4.25; 14 qt., $5 25
Iron Clad. .....₩ doz., 14 qt., $4.25 @ $4.50
Whiting's Flat Iron Band.....₩ doz $4.25 @ $4.50
Whiting's Wired Top.....₩ doz $4.00 @ $.25

Well Wheels—8 in., $2; 10 in., $2.25; 12 in., $3.25

Wire.
Iron—
Market, Br. & Ann., Nos. 0 to 18.....dis 70&10@75 %
Market, Coppered, Nos. 0 to 18 .....dis 70@70&10 %
Market, Galvanized, Nos. 0 to 18 ....dis 65@65&10 %
Market, Tin'd, Tinned list Nos. 0 to 18.dis 65@65&5 %
Stone Br. & Ann'd, Nos. 16 to 18 ...dis 72½@72½&5 %
Stone, Bright and Ann'd, Nos. 19 to 26 dis 75@75&5 %
Stone, Br. & Ann'd, Nos. 27 to 36..dis 75&10@75&10&5 %
Stone, Tin'd, Tin'd list, Nos. 18 to 36.. dis 70@70&10 %
Tinned Broom Wire, Nos. 18 to 24.dis 72½@72½&5 %
Galvanized Fence.....dis 65@65&5 %
Annealed Fence, Nos. 8 & 9.....dis 70@70&5 %
Annealed Grape, Nos. 10 to 14 .....dis 70@70&5 %
Brass and Copper, list, Jan. 18, '84.....dis 15 @ 20 %
Baro Fence.....see Trade Report
Wire on Spools .....dis 65 %
Wallin's Steel and Tinned Wire on Spools.....dis 50 %
Wallin's Brass and Copper Wire on Spools.....dis 40 %
Cast Steel Wire.....dis 50 %
Scuby Steel Wire.....$5.00 to 2, dis 30 %
Steel Music Wire, Nos. 12 to 30.....55¢ ₩ ℔
Picture Wire.....dis 60&10 %
Barb Wire Safety Guards.....₩ 1000 $9.00, dis 25 %
Wire Clothes Lines. See Lines.

Wire Cloth, green, drab and black, ₩ 100 sq. No. 34 Wire, $1.90; No. 33 Wire, $2.00

Wire Goods.—See Bright Wire Goods.

Wire Rope.—List May 1, 1886.....dis 33⅓

Wrenches.—American Adjustable.....dis 45 %
Baxter's Adjustable "S".....dis 35&10 %
Baxter's Diagonal.....dis 40 @ 40&10
Coes' Genuine.....dis 55&3 %
Coes' "Mechanics'".....dis 55&10&3 %
Girard Standard.....dis 70&10 %
Lamson & Sessions' Engineers'.....dis 60&10 %
Lamson & Sessions' Standard .....dis 70&10 %
Coes Pattern, Wrought.....
Girard Agricultural .....
Lamson & Sessions' Agricultural..
Sterling Wrought.....
} ..dis 80 @ 80&5 %
Bemis & Call's Patent Combination.....dis 35 %
Bem's & Call's Merrick's Pattern .....dis 35 %
Bemis & Call's Brigg's Patt.....dis 25 %
Bemis & Call's Cylinder or Gas Pipe .....dis 40&5 %
Remis & Call's No. 3 Pipe.....dis 35&5 %
Aiken's Pocket (Bright).....$6 00, dis 50&10 %
The Favorite Pocket (Bright).....₩ doz $4.00, dis 40¢
Webster's Patent Combination.....dis 25 %
Boardman's.....dis 25@25&10 %
Always Ready.....dis 25&5 %
Alligator.....dis 50 %
Donohue's Engineer.....dis 25 %
Acme, Bright.....dis 60&3 %
Acme, Nickeled.....dis 10&3 %
Walker's.....dis 55&3 %
Diamond.....dis 40 %
Diamond Patent Steel .....dis 40 %

Wrought Goods.
Staples Hooks, &c., list Jan. 12, '87.dis 80&20@85&10 %

CURRENT METAL PRICES.

FEBRUARY 29, 1888.

IRON AND STEEL.

Bar Iron from Store.

Common Iron :	
¾ to 2 in. round and square.. 1 to 6 in. x ⅝ to 1 in.....	₩ lb 2.10 @ 2.20¢
Refined Iron :	
¾ to 2 in. round and square.. 1 to 4 in. x ⅜ to 1¼ in..... 4½ to 6 in. x ⅜ to 1 in	₩ lb 2.25 @ 2.40¢
1 to 6 in. x ¼ and 5-16	₩ lb 2.45 @ 2 60¢
Rods—⅜ and 11-16 round and sq..₩ lb	2.35 @ 2.50¢
Bands—1 to 6 x 3-16 to No. 12.....₩ lb	2 50 @ 2.60¢
" Burden's Best " Iron base price₩ lb	3.00 @ .... ¢
Burden's " H. B. & S." Iron, base price.....	₩ lb 2 80 @ ....¢
" Ulster ".....	lb lb 3.10 @ ....¢
Norway Rods	4 00 @ 5.00¢

Merchant Steel from Store.

Per pound.

Open-Hearth and Bessemer Machinery, Toe Calk, Tire and Sleigh Shoe, base price in small lots.....	3¢ @ 3½¢
Best Cast Steel, base price in small lots.9¢	@ 10¢
Best Cast Steel Machinery, base price in small lots	5½¢ @ 6¢

Extras on Merchant Steel.

For classification and extras adopted by the Merchant Steel Association of the United States January 11, 1888, see *The Iron Age*, Feb. 23, 1888.

Sheet Iron from Store.

	Common American.	R. G.	Cleaned.
10 to 16.....₩ lb	2.75 @ 2.80¢	3.25 @	¢
17 to 20 ....₩ lb	2.85 @ 3 00¢	3 25 @ 3.50	¢
21 to 24.....₩ lb	3 00 @ 3.10¢	3.50 @	¢
25 and 26....₩ lb	3 20 @ ....¢	3.75 @	¢
27..... ...₩ lb	3 75 @ 3.37½¢	4.00 @	¢
28.....₩ lb	3.50 @ .....¢	4.00 @	¢

	B. B.	2d qual.
Galvanized, 14 to 20.....₩ lb	4.80¢	4.50 ¢
Galvanized, 21 to 24.....₩ lb	5.20¢	4.87½¢
Galvanized, 25 to 26.....₩ lb	5 60¢	5.25 ¢
Galvanized, 27.....₩ lb	6.0¢	5.62½¢
Galvanized 28 .....₩ lb	6.40¢	6.00 ¢
Patent Planished.....₩ lb	A 10¢	B. 9¢
Russia.....₩ lb	9½¢ @ 10¢	
American Cold Rolled B. B.....₩ lb	5¢ @ 7¢	

English Steel from Store.

Best Cast ....₩ lb	14½ @ 15 ¢
Extra Cast ....₩ lb	16½ @ 17 ¢
Swaged, Cast.....₩ lb	16 ¢
Best Double Shear.....₩ lb	15 ¢
Blister, 1st quality.....₩ lb	12½¢
German Steel, best.....₩ lb	10 ¢
2d quality.....₩ lb	9 ¢
3d quality ....₩ lb	8 ¢
Sheet Cast Steel, 1st quality.....₩ lb	15 ¢
2d quality.....₩ lb	14 ¢
3d quality.....₩ lb	12½¢

METALS.

Tin.

	Per lb
Banca, Figs.....	38 @ 38½¢
Straits, Figs.....	38 @ 38½¢
English, Figs.....	37½¢
Straits in Bars.....	39 @ 40 ¢

Tin Plates.

Charcoal Plates.—Bright. Per box.

Melyn Grade.....	IC, 10 x 14.....	$6.50
" "	IC, 12 x 12.....	6.75
" "	IC, 14 x 20.....	6.50
" "	IC, 20 x 28.....	13.00
" "	IX, 10 x 14.....	8.00
" "	IX, 12 x 12.....	8.25
" "	IX, 14 x 20.....	8.0
" "	IX, 20 x 28.....	16.00
" "	DC, 12½ x 17.....	6.00
" "	DX, 12½ x 17.....	7 50
Calland Grade...	IC, 10 x 14.....	6.0
" "	IC, 12 x 12.....	6.25
" "	IC, 14 x 20.....	6 00
" "	IX, 10 x 14.....	7.50
" "	IX, 12 x 12.....	7.75
" "	IX, 14 x 20.....	7.50
Allaway Grade....	IC, 10 x 14.....$5.25 @	5.50
" "	IC, 12 x 12..... 5.50 @	5.75
" "	IC, 14 x 20..... 5.25 @	5.50
" "	IC, 20 x 28..... 10.75 @	11.00
" "	IX, 10 x 14..... 6.50 @	6.75
" "	IX, 12 x 12..... 6 75 @	7.00
" "	IX, 14 x 20..... 6.50 @	6.75
" "	IX, 20 x 28..... 12.75 @	13.00
" "	DC, 12½ x 17..... 5.00 @	5.25
" "	DX, 12½ x 17..... 6.00 @	6.25

Coke Plates.—Bright.

Steel Coke.—IC, 10 x 14, 14 x 20.....	$4.90 @ $5.10
10 x 20.....	7.50 @ 8.00
20 x 28.....	10.00 @ 10.25
IX, 10 x 14, 14 x 20.....	6.00
BV Grade.—IC, 10 x 14, 14 x 20.....	4.90 @ 5.00

Charcoal Plates.—Terne.

Dean Grade.—IC, 14 x 20.....	$4 75
20 x 28.....	$9.25 @ 9.50
IX, 14 x 20.....	5.75
20 x 28.....	11.50
Abecarne Grade.—IC, 14 x 20.....	$4.50 @ 4.65
20 x 28.....	9.00 @ 9 25
IX, 14 x 20.....	5.50 @ 5.75
20 x 28.....	11.00

Tin Boiler Plates.

IXX, 14 x 26.....	112 sheets.....	$12 50 @ $12 75
IXX, 14 x 28.....	112 sheets.....	12 75 @ 13 0
IXX, 14 x 31.....	112 sheets	14.25 @ 14.50

Copper.

DUTY: Pig, Bar and Ingot, 4¢; Old Copper, 3¢ ₩ lb. Manufactured (including all articles of which Copper is a component of chief value), 45 % ad valorem.

Ingot.

Lake.....	17.50¢
" Anchor " Brand.	16.50¢ @ 17¢

Sheet and Bolt.

Prices adopted by the Association of Copper Manufacturers of the United States, December 10, 1887.

Not wider than	Not longer than	And longer than	Weights per square foot and prices per pound. Over 64 oz.	32 to 64 oz.	16 to 32 oz.	14 to 16 oz.	12 to 14 oz.	10 to 12 oz.	8 to 10 oz.	Less than 8 oz.
30	72	----	25	25	25	26	27	28	31	33
30	----	72	25	25	25	26	28	30	34	...
36	96	----	25	25	25	27	29	33	36	...
36	----	96	25	25	26	28	30	34	38	...
48	96	----	25	25	27	29	31	35	...	...
48	----	56	25	25	28	30	32	36	...	...
60	96	----	25	25	30	32	37	...	...	...
67	----	96	25	26	31	...	...	...	...	...
84	96	----	26	27	...	...	...	...	...	...
84	----	96	27	28	...	...	...	...	...	...
Over 84 in. wide			28	30	...	...	...	...	...	...

All Bath Tub Sheets.....	16 oz. 14 oz. 12 oz. 10 oz.
Per pound.....	$0.28 0 30 0.32 0 35
Bolt Copper, ¾ inch diameter and over, per pound.....	25¢

Circles, 60 inches in diameter and less, 3 cents per pound advance over lowest prices of Sheet Copper of the same thickness.

Circles over 60 inches diameter, up to 96 inches diameter inclusive, 5 cents per pound advance over lowest prices of Sheet Copper of the same thickness.

Circles, over 96 inches diameter, 6 cents per pound advance over lowest prices of Sheet Copper of the same thickness.

Segment and Pattern Sheets, 3 cents per pound advance over price of sheets required to cut them from.

Cold or Hard Rolled Copper, 14 ounces per square foot and heavier, 1 cent per pound over the foregoing prices.

Cold or Hard Rolled Copper, lighter than 14 ounces per square foot, 2 cents per pound over the foregoing prices.

Copper Bottoms, Pits and Flats.

	Per pound
14 ounce to square foot and heavier.....	28¢
12 ounce and up to 14 ounce to square foot.....	29¢
10 ounce and up to 12 ounce.....	31¢

Circles less than 8 inches diameter 2 cents per pound additional.

Circles over 13 inches diameter are not classed as Copper Bottoms.

Brass and Copper Tubes.

Seamless Copper.		Seamless Brass.	
⅜ inch ₩ lb.....	50¢	⅜ inch ₩ lb.....	47¢
½ " "	44¢	½ " "	41¢
⅝ " "	42¢	⅝ " "	39¢
¾ " "	40¢	¾ " "	37¢
⅞ " "	39¢	⅞ " "	35¢
1 " "	37¢	1 " "	34¢
1½ " "	32¢	1½ " "	31¢

Roll and Sheet Brass.

Discount from list. ..... .10 @ 15 %

Spelter.

Duty: Pig, Bars and Plates, $1.50 ₩ 100 lb.

Western Spelter.....	5¾ @ 6¢
" Berg-nport ".....	8½¢
"Bertha ".....	7¾ @ 8¢

Zinc.

Duty: Sheet, 2½¢ ₩ lb.

600 lb casks.....	6½¢
Per lb.....	7 @ 7½¢

Lead.

Duty: Pig, $2 ₩ 100 lb. Old Lead, 2¢ ₩ lb. Pipe and Sheets, 3¢ ₩ lb.

American.....	@ 5¼¢
Newark.....	@ 5¼¢
Bar.....	5¾¢
Pipe.....	7¼ %, dis 20 %
Tin-Lined Pipe.....	15¢ dis 20 %
Block Tin Pipes.....	55¢, dis 20 %
Sheet.....	8¼¢, dis 20 %

Solder.

½ @ ½ (Guaranteed).....	23¢
Extra Wiping.....	30¢

The prices of the many other qualities of Solder in the market indicated by private brands vary according to composition.

Antimony.

Cookson.....	₩ lb 15¢
Hallett's.....	" 12¢

Sundries.

Asphaltum, Cuban, ₩ lb.....	5½ @ 6½¢
Asphaltum, Egyptian.....	8 @ 9½¢
Benzine, 62°, ₩ gal.....	8½ @ 9½¢
Coal Tar.....	₩ bbl., $3 00 and $4 00
Chalk, ₩ 100 lb.....	4¢
Chalk, Block.....	3½¢
Crucibles No 14 and upward, ₩ number	3½¢
Grain Emery, 300 lb kegs.....	4 @ 4½¢
Flour Emery, finest quality.....	2½ @ 2¾¢
Glue, White	18 @ 35¢
Glue, Sheet.....	13 @ 20¢
Glaziers' Points, Zinc, ₩ box.....	$4.75
Gum, Copal	80¢
Gum, Damar	25¢
Gum, Shellac, English	30¢
Gum, Shellac, English, dark.....	22¢
Mineral Wool, ordinary, ₩ lb.....	1 @ 1¼¢
Mineral Wool, extra.....	3 @ 3½¢
Naphtha 70°.....	9 @ 10¢
Naphtha 76°.....	9½ @ 10¼¢
Pumice Stone, selected lumps.....	3 @ 6¢
Pumice Stone, powdered.....	2 @ 2½¢
Pine Tar, bbls	$2.10 @ $2.12½
Pitch.....	$1.40
Plumbago, E. I Po..₩ lb ..	4 @ 6¢
Plumbago, American, ₩ lb.....	6 @ 10¢
Plumbago, Gun Powder Glazing, ₩ lb.....	10¢
Plumbago, Shot Polish, ₩ lb	10¢
Putty, in bladders.....	2½¢
Putty, in bulk.....	1¾ @ 2¢
Rosin, Strained and Good..	$1.37½ @ $1.40
Rosin, E. & F.....	$1.42½ @ $1.47½
Rosin, G. & H.....	$1.55 @ $1.62½
Rosin, I & K.....	$1.75 @ $1.80
Rosin, M. & N,.....	$2 00 @ $2.25
Spirits Turpentine, ₩ bbl.....	41 @ 44¢
Stove Polish, Dixon's	₩ gross, $6 00
Stove Polish, Rising Sun.....	5.00
Stove Polish, Gem	4.50
Stove Polish, Jet Black.....	3.50
Waste, No. 1 Cop	8¾¢
Waste, No. 1 White Machine.....	8¾¢
Waste, No. 2 White Machine.....	8¾¢
Waste, No. 1 Colored.....	6¼¢
Waste, No. 2 Colored.....	5¾¢
Waste, Washed Machine.....	8¼¢
Whiting, Spanish, ₩ 100 lb	50¢

FRENCH GLASS.

January 20, 1887—Per Box 50 feet.

Sizes.		Single. 1st.	2d.	3d.	4th.
		E F H	I E H	H H	H E
25	6 x 8 to 10 x 15.....	$10.50	$9 00	$8.50	$8.00
40	11 x 14 to 16 x 24	11.50	10.75	10.25	9 75
50	18 x 22 to 20 x 30	15.50	14.00	13 00	12 50
54	15 x 36 to 24 x 30.....	16 50	15.00	13.50	...
60	26 x 28 to 24 x 36.....	17.75	16.25	14.75	...
70	26 x 36 to 26 x 44.	19.00	17.50	15.25	...
80	26 x 46 to 30 x 50.....	21.00	19.50	17.00	...
84	30 x 52 to 30 x 54.....	22.00	20.25	18.00	...
90	30 x 56 to 34 x 56.....	23.00	21.25	19 00	...
94	34 x 58 to 34 x 60.....	24.00	22.75	21.00	...
100	36 x 60 to 40 x 60.....	26.50	24.50	23.00	...

Sizes.		Double. 1st.	2d	3d	4th
		E F H D	I E H D	H H D	H E D
25	6 x 8 to 10 x 15.....	$13.00	$12.00	$12 00	$11.50
40	11 x 14 to 16 x 24.....	16.00	15.00	14.50	...
50	18 x 22 to 20 x 30.....	20 50	19.50	18.50	...
54	15 x 36 to 24 x 30	21.00	20.75	19.50	...
60	26 x 28 to 24 x 36	25.00	23.00	21.50	...
70	26 x 36 to 26 x 44.....	26.00	25.00	23.00	...
80	26 x 46 to 30 x 50.....	28.00	26.50	24.50	...
84	30 x 52 to 30 x 54.....	30.00	28.00	26.00	...
90	30 x 56 to 34 x 56.....	31.00	30.00	28.00	...
94	34 x 58 to 34 x 60.....	32.50	31.00	29.00	...
100	36 x 60 to 40 x 60.....	36.00	32.50	32.00	...

Sizes above—$15 per box extry for everp 5 inches
Discount—70 & 10 & 5 %.

AMERICAN GLASS.

Price Per Box of 50 Feet.

United Inches.	Sizes.	Single. AA	A	B	C
25	6 x 8 to 10 x 15...	$10.50	$9 00	$8.50	$8.00
40	11 x 14 to 16 x 24.	11.50	10.75	10.25	9.75
50	18 x 22 to 20 x 30...	15.5	14.00	13.00	12.50
54	15 x 36 to 24 x 30...	16.50	15.00	13.50	....
60	26 x 28 to 24 x 36...	17.75	16.25	14 75	...
70	26 x 36 to 26 x 44...	19.00	17.50	15.25	...
80	26 x 46 to 30 x 50...	21.00	19 50	17 00	...
84	30 x 52 to 30 x 54...	22 00	20.25	18.00	...
90	30 x 56 to 34 x 56...	23 00	21.25	19.00	....
94	34 x 58 to 34 x 60...	24.0	22 75	21.00	....
100	36 x 60 to 40 x 60 ...	26.50	24.50	23.00	..

United Inches.	Sizes.	Double. AA	A	B	C
25	6 x 8 to 10 x 15...	$13. 0	$12.50	11 00	$10 00
40	11 x 14 to 16 x 24...	16.00	15 00	13.50	12.00
50	18 x 22 to 20 x 30...	20.50	19.50	18 00	....
54	15 x 36 to 24 x 30...	22.0 0	20.75	18.75	...
60	26 x 28 to 24 x 36...	25.00	23.00	21.00	....
70	26 x 36 to 26 x 44..	26.00	25.00	22.5	...
80	26 x 46 to 30 x 50...	28.00	26.50	33.75	....
84	30 x 52 to 30 x 54...	30.00	28.00	25.25	....
90	30 x 56 to 34 x 56 ..	31 0 0	30.0 0	27.00	....
94	34 x 58 to 34 x 60...	32.50	31.00	28.00	....
100	36 x 60 to 40 x 60..	36.00	33.50	30.00	....

Sizes above—$10 per box extra for every 5 inches
Discount—75 % single strength; 75 & 5 % double strength.